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DFSMS Software Support for IBM TotalStorage Tape System 3590 Models E1x/H1x

z/OS



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Note

Before using this information and the product it supports, be sure to read the general information under "Notices" on page 51.

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About This Book

This book documents z/OS™ Data Facility Storage Management Subsystems (z/OS DFSMS) support for Models E1x and H1x tape drives. It is designed to help system operators, system programmers, and application programmers understand, install, and operate the IBM TotalStorage Tape System 3590 Model E1x/H1x software support. The 3590 Model H1x tape drive is the latest offering in the IBM 3590 family of longitudinal technology tape devices. After briefly introducing the functional features of the Models E1x and H1x tape drives, it describes the modifications made to z/OS DFSMS functional components and related program products in support of the drive. For that purpose, it addresses specific migration and coexistence considerations for implementing the tape drives and explores critical dependencies. Whenever available, it provides information on additional support and resources for using the Models E1x and H1x tape drives.

Additional information on z/OS DFSMS Object Access Method (OAM) support for the Models E1x and H1x tape drives can be found in *z/OS DFSMS OAM Planning, Installation, and Storage Administration Guide for Tape Libraries*.

Required Product Knowledge

To use this book effectively, you should be familiar with the following software products:

- MVS™ job entry subsystem 3 (JES3)
- Storage management subsystem (SMS)
- Object access method (OAM)
- DFSMS hierarchical storage manager (DFSMSHsm™)
- DFSMS removable media manager (DFSMSRmm™)
- Access method services (AMS)
- Open/close/end-of-volume (O/C/EOV)
- Device support/asynchronous operations manager (AOM)
- Interactive storage management facility (ISMF)
- Data facility sort (DFSORT™)
- Environmental recording, editing, and printing (EREP)

Referenced Publications

The following publications are referenced in this book:

Publication Title	Order Number
<i>z/OS DFSMS Access Method Services</i>	SC26-7394
<i>z/OS DFSMS: Implementing System-Managed Storage</i>	SC26-7407
<i>z/OS DFSMSHsm Diagnosis Guide</i>	LY35-0114
<i>z/OS DFSMSHsm Storage Administration Reference</i>	SC35-0422
<i>z/OS DFSMSRmm Application Programming Interface</i>	SC26-7403
<i>z/OS DFSMSRmm Guide and Reference</i>	SC26-7404
<i>z/OS DFSMSRmm Implementation and Customization Guide</i>	SC26-7405
<i>z/OS DFSMS Installation Exits</i>	SC26-7396

Publication Title	Order Number
<i>z/OS DFSMS OAM Planning, Installation, and Storage Administration Guide for Tape Libraries</i>	SC35-0427
<i>z/OS DFSMS: Using the Interactive Storage Management Facility</i>	SC26-7411
<i>z/OS DFSMS: Using Magnetic Tapes</i>	SC26-7412
<i>IBM TotalStorage Enterprise Tape System 3590 Introduction and Planning Guide</i>	GA32-0329
<i>IBM TotalStorage Enterprise Tape System 3590 Technical Guide</i>	GG24-2506
<i>z/OS JES3 Initialization and Tuning Reference</i>	SA22-7550

Accessing z/OS DFSMS Documents on the Internet

In addition to making softcopy documents available on CD-ROM, IBM provides access to unlicensed z/OS softcopy documents on the Internet. To find z/OS documents on the Internet, first go to the z/OS home page:
<http://www.ibm.com/servers/eserver/zseries/zos>

From this Web site, you can link directly to the z/OS softcopy documents by selecting the Library icon. You can also link to IBM Direct to order hardcopy documents.

Using LookAt to look up message explanations

LookAt is an online facility that allows you to look up explanations for z/OS messages, system abends, and some codes. Using LookAt to find information is faster than a conventional search because in most cases LookAt goes directly to the message explanation.

You can access LookAt from the Internet at:

<http://www.ibm.com/servers/eserver/zseries/zos/bkserv/lookat/lookat.html>

or from anywhere in z/OS where you can access a TSO command line (for example, TSO prompt, ISPF, z/OS UNIX System Services running OMVS).

To find a message explanation on the Internet, go to the LookAt Web site and simply enter the message identifier (for example, IAT1836 or IAT*). You can select a specific release to narrow your search. You can also download code from the *z/OS Collection*, SK3T-4269 and the LookAt Web site so you can access LookAt from a PalmPilot (Palm Vllx suggested).

To use LookAt as a TSO command, you must have LookAt installed on your host system. You can obtain the LookAt code for TSO from a disk on your *z/OS Collection*, SK3T-4269 or from the LookAt Web site. To obtain the code from the LookAt Web site, do the following:

1. Go to <http://www.ibm.com/servers/eserver/zseries/zos/bkserv/lookat/lookat.html>.
2. Click the **News** button.
3. Scroll to **Download LookAt Code for TSO and VM**.
4. Click the ftp link, which will take you to a list of operating systems. Select the appropriate operating system. Then select the appropriate release.
5. Find the **lookat.me** file and follow its detailed instructions.

To find a message explanation from a TSO command line, simply enter: **lookat message-id**. LookAt will display the message explanation for the message requested.

Note: Some messages have information in more than one document. For example, IEC192I has routing and descriptor codes listed in *z/OS MVS Routing and Descriptor Codes*. For such messages, LookAt prompts you to choose which document to open.

Accessing Licensed Documents on the Web

z/OS licensed documentation in PDF format is available on the Internet at the IBM Resource Link Web site at:

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3. Click on **zSeries**.
4. Click on **Software**.
5. Click on **z/OS**.
6. Access the licensed document by selecting the appropriate element.

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Your feedback is important in helping to provide the most accurate and high-quality information. If you have any comments about this book or any other DFSMS documentation:

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- IBMLink from Canada: STARPUBS at TORIBM
- IBM Mail Exchange: USIB3VVD at IBMMAIL
- Internet: starpubs@us.ibm.com

Be sure to include the name of the book, the part number of the book, version and product name, and if applicable, the specific location of the text you are commenting on (for example, a page number or a table number).

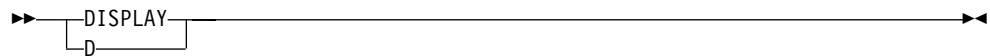
- Fill out one of the forms at the back of this book and return it by mail or by giving it to an IBM representative. If the form has been removed, address your comments to IBM Corporation, Department 61C, 9000 South Rita Road, Tucson, Arizona 85744-0001, U.S.A.

How to Read Syntax Diagrams

There is one basic rule for reading the syntax diagrams: Follow only one line at a time from the beginning to the end and code everything you encounter on that line.

The following rules apply when reading syntax diagrams:

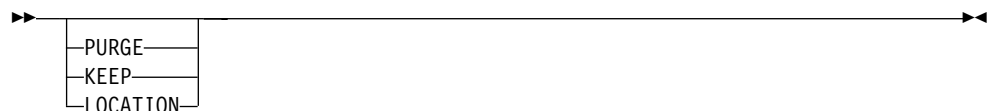
- Read the syntax diagrams from left to right and from top to bottom.
- Each syntax diagram begins with a double arrowhead (▶▶) and ends with opposing arrows (◀▶).
- An arrow (→) at the end of a line indicates that the syntax continues on the next line. A continuation line begins with an arrow (←).
- Commands and keywords are shown in uppercase letters.
- Some commands and keywords have alternative abbreviations; these appear as part of the stack for that command or keyword. For example, the alternative abbreviation for **DISPLAY** is **D**.



- Where you can choose from two or more keywords, the choices are stacked one above the other. If one choice within the stack lies on the main path, a keyword is required, and you must choose one. In the following example you must choose either **DETAIL** or **STATUS**.



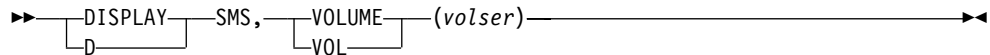
- If a stack is placed below the main path, a keyword is optional, and you can choose one or none. In the following example, **PURGE**, **KEEP**, and **LOCATION** are optional keywords. You can choose any one of the three.



- Where you can choose from two or more keywords and one of the keywords appears above the main path, that keyword is the default. You may choose one or the other of the keywords, but if none is entered, the default keyword is automatically selected. In the following example you may choose either **DETAIL** or **STATUS**. If neither is chosen, **STATUS** is automatically selected.



- Words or names in italicized, lowercase letters represent information that you supply. The values of these variables may change depending on the items to which they refer. For example, *volser* refers to the serial number of a volume, while *storgrp_name* refers to the name of a storage group.
- You must provide all items enclosed in parentheses (). You must include the parentheses. In the following example, you must supply the volume serial number (*volser*) and it must be enclosed in parentheses.

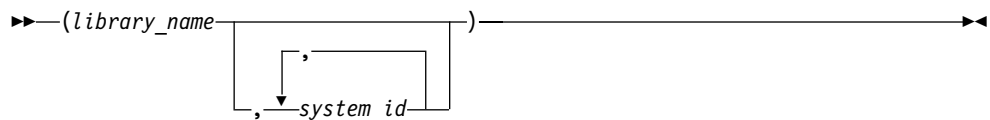


You would code this as follows:

D SMS,VOL(*volser*)

The variable *volser* is the serial number of the volume you wish to display.

- The repeat symbol shown below indicates that you can specify keywords and variables more than once. The repeat symbol appears above the keywords and variables that can be repeated. For example, when a comma appears in the repeat symbol, you must separate repeated keywords or variables with a comma. In the following example, you may specify the *library_name* and one or more system identification numbers (*system_id*) that are separated by commas. You must enclose the name of the library and all of the system IDs in parentheses.



You would code this as follows:

(*library_name*, *system_id*, *system_id*, *system_id*)

The variable *library_name* is the name of the library you are working with, and *system_id* names three different instances of system identification numbers.

Chapter 1. Introduction

This chapter introduces the IBM TotalStorage Enterprise Tape System 3590 Models B1x, E1x, and H1x tape drives and summarizes the z/OS DFSMS software support needed to use them. In doing so, it provides an overview of IBM TotalStorage Enterprise Tape System 3590, highlights the functional features of 3590 tape drives, and describes the major enhancements of Models E1x and H1x over previous models.

IBM TotalStorage Enterprise Tape System 3590

The IBM TotalStorage Enterprise Tape System 3590 provides high capacity, performance, and reliability, along with a wide range of host connectivity. Specifically, the IBM TotalStorage Enterprise Tape System 3590 offers the following features:

- Creates tapes for archive files
- Backs up and restores systems in case of system or disk storage problems
- Stores high-speed, high-capacity sequential application data sets
- Stores temporary data sets
- Satisfies off-site data storage for disaster recovery
- Provides data interchange with other systems that use 3590 subsystems

The TotalStorage Enterprise Tape System 3590 consists of one or more 3590 tape drives. These drives and their capabilities are discussed in “Model B1x Tape Drive”, “Model E1x Tape Drive” on page 2, and “Model H1x Tape Drive” on page 3.

Model B1x Tape Drive

The TotalStorage Enterprise Tape System 3590 Model B1x tape drive uses the 3590 high-performance cartridge tape media (MEDIA3) and the 3590 extended high-performance cartridge tape media (MEDIA4). There are automated cartridge facilities (ACF) with a ten-cartridge magazine for each drive, and, as an option, a 3590 Model A00, A50, or A60 controller. When the controllers are attached to enterprise systems connection (ESCON) channels, they connect to 3590 tape drives through the small computer system interface-2 (SCSI-2) or ultra-SCSI interface. With native fibre connection (FICON) attachment, the controllers can provide even greater improvements in tape performance and attachment distance.

In this book, the term “B1x” refers to Models B1A and B11. Model B1A is designed for use in the automated tape library environment and Model B11 for use in the stand-alone or manual tape library environment.

At a glance, the Model B1x tape drive offers the following features:

- Coexists with 3490 and 3490E devices in the 3495 automated tape library (ATL)
- Coexists with 3490E and other 3590 devices in the 3494 automated tape library
- Coexists with 3490, 3490E, and other 3590 devices in a manual tape library (MTL)
- Exists as a stand-alone device
- Functions as a 3590-1 drive or emulates a 3490E drive
- Transfers data at a rate of 9 MB per second, increasing by three times the data transfer rate of the 3490E drives
- Reads and writes 128-track media

- Contains an optional 10-cartridge capacity ACF
- Improves data compressibility by 33% over the 3480 and the 3490, depending on the type of data
- Uses the high-performance cartridge tape media and extended high-performance cartridge tape media, which are half-inch magnetic tape cartridges. Physically similar to the 3490 cartridges, these tape cartridges have the following capacities:
 - 10 GB uncompressed capacity (MEDIA3)
 - 20 GB uncompressed capacity (MEDIA4)
 - 30 GB typical compressed capacity (MEDIA3)
 - 60 GB typical compressed capacity (MEDIA4)
 - Serpentine 16-track recording with eight passes providing 128 tracks

In summary, the Model B1x tape drive offers you significant improvements over 3480 and 3490 devices through increased data transfer rate and increased data storage capacity.

Refer to the *IBM TotalStorage Enterprise Tape System 3590 Introduction and Planning Guide* and the *IBM TotalStorage Enterprise Tape System 3590 Technical Guide* for additional information on the 3590 Model B1x tape drive hardware.

Model E1x Tape Drive

Figure 1 shows the IBM TotalStorage Enterprise Tape System 3590 Model E1x. In this book, the term “E1x” refers to Models E1A and E11. Model E1A is designed for use in the automated tape library environment and Model E11 for use in the stand-alone or manual tape library environment.

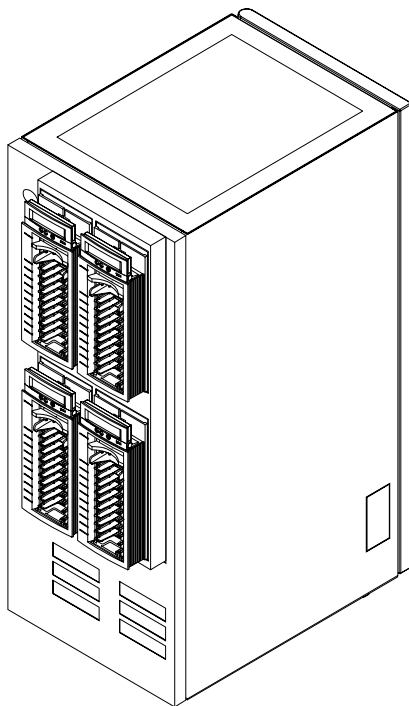


Figure 1. IBM TotalStorage Enterprise Tape System 3590 Models E1x and H1x Tape Drives

This new model inherits many of the basic features of Model B1x tape drive as described in “Model B1x Tape Drive” on page 1. More importantly, with the number

of tracks increased from 128 to 256, this new model doubles the storage capacity of the high-performance cartridge tape media and extended high-performance cartridge tape media and improves its capability to exploit media capacity. Its performance is also improved because of the enhanced components and linear velocity.

At a glance, the Model E1x tape drive offers the following features:

- Reads 128-track media
- Reads and writes 256-track media
- Transfers data at a rate of 14 MB per second, increasing the data transfer rate of the Model B1x by 56%
- Emulates 3590-1 Model B1x or 3490E tape drives
- Coexists with 3490E and other 3590 devices in the 3494 automated tape library
- Coexists with 3490, 3490E, and other 3590 devices in a manual tape library
- Exists as a stand-alone device
- Uses the same physical media as that in Model B1x tape drives (MEDIA3 and MEDIA4)
- Uses high-performance cartridge tape media and extended high-performance cartridge tape media to record at the following capacities:
 - 20 GB uncompressed capacity (MEDIA3)
 - 40 GB uncompressed capacity (MEDIA4)
 - 60 GB typical compressed capacity (MEDIA3)
 - 120 GB typical compressed capacity (MEDIA4)

In summary, the IBM TotalStorage Enterprise Tape System 3590 Model E1x tape drive enables you to manage escalating demands for tape storage and to control the growing duration of batch-processing and backup windows. It also offers you improved storage capacity, data rate, and other performance enhancements.

Refer to the *IBM TotalStorage Enterprise Tape System 3590 Introduction and Planning Guide* and the *IBM TotalStorage Enterprise Tape System 3590 Technical Guide* for additional information on the 3590 Model E1x tape drive hardware. See “z/OS DFSMS Software Support for the Model E1x Tape Drive” on page 4 for information on the software support for the Model E1x tape drive.

Model H1x Tape Drive

Figure 1 on page 2 shows the IBM TotalStorage Enterprise Tape System 3590 Model H1x tape drive. In this book, the term “H1x” refers to Models H1A and H11. Model H1A is designed for use in the automated tape library environment, and Model H11 is designed for use in the stand-alone or manual tape library environment.

The Model H1x tape drive inherits many of the basic features of Model E1x tape drive, as described in “Model E1x Tape Drive” on page 2, with enhancements in data capacity. At a glance, the Model H1x tape drive offers the following features:

- Reads and writes 384-track media, thus increasing data capacity by 50% over the Model E1x
- Reads 128- and 256-track media
- Uses the same physical media as that used in Model B1x and Model E1x tape drives (MEDIA3 and MEDIA4)
- Reuses existing Model B1x and Model E1x tape cartridges

- Uses high-performance cartridge tape media and extended high-performance cartridge tape media to record at the following capacities depending on the type of data:
 - 30 GB uncompressed capacity (MEDIA3)
 - 60 GB uncompressed capacity (MEDIA4)
 - 90 GB typical compressed capacity (MEDIA3)
 - 180 GB typical compressed capacity (MEDIA4)
- Emulates 3590-1 Model B1x or 3490E tape drives
- Coexists with 3490E and other 3590 devices in the 3494 automated tape library
- Coexists with 3490, 3490E, and other 3590 devices in a manual tape library
- Exists as a stand-alone device
- Transfers data at the same rate as the Model E1x (14 MB per second)

In summary, the IBM TotalStorage Enterprise Tape System 3590 Model H1x tape drive reduces data storage costs by increasing media capacity.

Refer to the *IBM TotalStorage Enterprise Tape System 3590 Introduction and Planning Guide* and the *IBM TotalStorage Enterprise Tape System 3590 Technical Guide* for additional information on the 3590 Model H1x tape drive hardware. See “z/OS DFSMS Software Support for the Model H1x Tape Drive” on page 6 for information on the software support for the Model H1x tape drive.

z/OS DFSMS Software Support for the Model E1x Tape Drive

z/OS DFSMS provides full software support for using the Model E1x tape drive in an IBM 3494 ATL and in the MTL. z/OS DFSMS full support particularly addresses device allocation and media management. It allows the Model E1x tape drive to operate in a 3590-1 emulation mode and can coexist with real 3590-1 drives (Model B1x) and Model H1x tape drives in the same library.

In support of the Model E1x tape drive, modifications are made to various z/OS DFSMS components, MVS Device Allocation, Environmental Recording, Editing, and Printing (EREP), and Job Entry Subsystem 3 (JES3). z/OS DFSMS includes the following functional components:

- Access method services (AMS)
- Device support/asynchronous operations manager (AOM)
- DFSMS hierarchical storage manager (DFSMSHsm)
- DFSMS removable media manager (DFSMSrmm)
- Data facility sort (DFSORT)
- Interactive storage management facility (ISMF)
- Object access method (OAM)
- Open/close/end-of-volume (O/C/EOV)
- Storage management subsystem (SMS)

Notes:

1. All changes to z/OS DFSMS functional components and related program products for the 3590 Model E1x tape drive support are described in the succeeding chapters of this book. The only exception is the changes to the OAM component, which are documented in *z/OS DFSMS OAM Planning, Installation, and Storage Administration Guide for Tape Libraries*.

2. DFSORT supports input, output, and work data sets that reside on Model E1x tape drives and processes them according to their emulated device types. In addition, DFSORT obtains the attributes and file sizes for DFSMSrmm-managed tape data sets using the DFSMSrmm application programming interface. As a result, DFSORT can automatically provide improved performance and resource utilization for these tape data sets. See *z/OS DFSMSrmm Application Programming Interface* for details on the DFSMSrmm API. Also, visit the web site <http://www.ibm.com/storage/dfsor> for additional information about DFSORT.

Using Model E1x Tape Drives in an IBM Library Environment

z/OS DFSMS full support is designed to address device allocation and media management in 3494 automated tape library and manual tape library datasever environments. This full support is required when Model E1x tape drives are installed.

Attention: Model E1x tape drives are not supported in 3494 ATLDS or MTL environments when they emulate 3490E drives.

Using Model E1x Tape Drives in a Stand-Alone Environment

As described in “Model E1x Tape Drive” on page 2, Model E1x tape drives emulate already-supported tape devices. Using these drives in a nonlibrary environment requires that you are able to manage mixed media and resolve drive allocation ambiguities between Model E1x drives and the actual models of drives being emulated (Model B1x or 3490E). This is because the emulated device type is recorded in the data set records of user catalogs. You may be required to use your own programs or a tape management product, such as z/OS DFSMSrmm, for that purpose.

Recommendation: Install the full software support for Model E1x tape drives. This support allows z/OS DFSMSrmm to record the real media type and provides true media capacity to z/OS DFSMSshm or similar products. It ensures accurate selection of a swapping device for dynamic device reconfiguration (DDR) and permits EREP reports by the actual, rather than the emulated, device types.

You need to be aware of other considerations when running Model E1x tape drives in a mixed, stand-alone (non-MTL) environment. In this context, “mixed” refers to a situation in which one of the following configurations exists:

- Model E1x drives emulate Model B1x drives and real Model B1x drives are present.
- Model E1x drives emulate 3490E drives and real 3490E drives are present.
- A Model E1x drive emulates a Model B1x drive while a second Model E1x drive emulates a 3490E drive.

See *IBM TotalStorage Enterprise Tape System 3590 Multiplatform Implementation Guide* for a detailed discussion about considerations for running emulated and real tape drives in a mixed environment.

z/OS DFSMS Software Support for the Model H1x Tape Drive

The 3590 Model H1x software support allows you to reduce your data storage and management costs by increasing the data storage capacity on both high-performance cartridge tape media and extended high-performance cartridge tape media. The 3590 Model H1x drive introduces a new 384-track recording format, up from the 256-track recording format of the Model E1x drive.

The increased track density of the Model H1x tape drive allows you to reduce floor space for tape storage devices, if so desired. The Model H1x can read any tape cartridge written by a Model B1x or Model E1x drive, as well as those written by a Model H1x drive. The Model H1x cannot, however, write in 128-track or 256-track format. It permits you to rewrite a 128-track or 256-track tape cartridge in 384-track format from the beginning of the tape, thus allowing you to reuse tape media that you already own. You may also append Model H1x-formatted data to previously written Model H1x-formatted data, but not to previously written Model B1x- or Model E1x-formatted data.

To support the new recording technology, this software changes AMS commands, functions, and displays. It enhances the ISMF interface to allow 384-track recording technology to be specified in data class definitions so that allocations can be directed to Model H1x drives through automatic class selection (ACS) routines. It records the 384-track recording technology in the tape configuration database (TCDB) as an attribute of volumes written on Model H1x drives to enable selection of the proper tape subsystems for specific allocations. This support also enhances AOM, HSM, OAM, RMM, O/C/EOV, and SMS to enable the 384-track recording technology.

Additionally, the software support for the Model H1x keeps track of and reports any previously recorded volume serial numbers assigned to reused Model B1x and Model E1x tape cartridges. This allows you to label 384-track format tape cartridges with existing volume serial numbers. Media interchange capabilities also exist, which enable a 384-track recorded volume to be reused on a 3590 Model B1x or E1x tape device.

Model H1x tape drives are supported only by the Model A60 controller, and not by any predecessor models (3590 Models A00 and A50, and 3591 Model A01). Model E1x tape drives are supported by the 3590 Model A00, A50, and A60 controllers, which means that they can write—but not append—to cartridges previously written by Model H1x tape drives. Model B1x tape drives are supported by the 3590 Model A00, A50, and A60 controllers and by the 3591 Model A01 controller. This means that they can write—but not append—to cartridges previously written by both Model E1x and Model H1x tape drives.

The scenario below describes this functionality.

Scenario 1: Lower-Density Drives Reading and Writing to Cartridges Written by Higher-Density Drives
--

A Model B1x drive attached to a 3590 Model A00, A50, or A60 controller can load a cartridge written by either a Model E1x or Model H1x drive, determine the existing internal volume serial number recorded, and rewrite the cartridge from the beginning, preserving the serial number if desired.

Similarly, a Model E1x drive attached to a 3590 Model A00, A50, or A60 controller can load a cartridge written by a Model H1x drive, determine the existing internal volume serial number recorded, and rewrite the cartridge from the beginning, preserving the serial number if desired.
--

Note: Model A01 controllers will not support the reporting of volume serial number information for cartridges written by higher-density drives.
--

Read-compatibility processing included in this support allows a MEDIA3 or a MEDIA4 volume written on a 3590 Model B1x tape drive using the 128-track recording technology or a 3590 Model E1x tape drive using the 256-track recording technology to be mounted and read on a 3590 Model H1x tape drive. For a volume inside of an IBM tape library, there is an existing special attribute field in the tape device selection information (TDSI) field in the tape volume record that can be set to read-compatible, enabling 3590 Model H1x tape drives to become eligible to read 128-track or 256-track recorded volumes.

If your installation is upgrading all of its existing 3590 Model B1x or 3590 Model E1x drives, or both, to 3590 Model H1x drives, you must take into consideration the read-compatibility considerations described above. As appropriate, set the read-compatible indicator in the TDSI. Otherwise, a request to read an existing 128-track or 256-track volume will fail with no devices being considered eligible for the request.

A key component of the 3590 Model H1x software support is that it is always in emulation mode, either as a 3590-1 Model B1x device or as a 3490E device. This allows the Model H1x to rewrite 3590 Model B1x and 3490E cartridges in the 384-track format, and to add 3590 Model H1x devices to third-party libraries.

This support carries forward from the Model E1x tape drive software support the ability to modify DEVSERV requests to display the emulated device type as well as the real device type. It also enhances the EREP program to report the correct model numbers when formatting LOGREC records for 3590 Model H1x devices when they are in emulation mode. And it enhances the DDR swap exit to handle swaps involving the Model H1x.

Note: Changes to z/OS DFSMS functional components and related program products for the 3590 Model H1x tape drive support are described in the succeeding chapters of this book. Additional information on changes to the OAM component can be found in *z/OS DFSMS OAM Planning, Installation, and Storage Administration Guide for Tape Libraries*.

Using Model H1x Tape Drives in an IBM Library Environment

Full software support for this release is designed to address device allocation and media management in 3494 automated or manual tape library environments. This full support is required when Model H1x tape drives are installed in an IBM library environment. It allows Model H1x drives to coexist with Model B1x and Model E1x drives in the same library.

Inside of an IBM tape library, only 3590-1 Model B1x emulation is supported. When the Model H1x tape drive is in emulation mode, the SMS tape library support recognizes the device as its real device type instead of its emulated device type; this enables “real” and emulated Model B1x tape drives to coexist and be properly managed in the same IBM tape library.

Attention: Model H1x tape drives are not supported in an IBM tape library environment when they emulate 3490E drives.

See Chapter 2, “Migrating to the Software Support for Model E1x and Model H1x Tape Drives” on page 9 and *z/OS DFSMS Migration* for additional considerations in using Model H1x devices in a mixed IBM library environment.

Using Model H1x Tape Drives in a Stand-Alone Environment

As described in “Using Model E1x Tape Drives in a Stand-Alone Environment” on page 5, you must manage media and device allocation according to your installation's storage management policies. You must segregate real and emulated device types, use DFSMSrmm or third-party tape management software, or write your own applications. Therefore, this support does not address media management and data allocation for 3590 Model H1x tape drives outside of an IBM library environment.

Chapter 2. Migrating to the Software Support for Model E1x and Model H1x Tape Drives

Overview

This chapter helps you plan for the migration and installation of the z/OS DFSMS software support for Model E1x and Model H1x tape drives. It outlines the tasks you must perform to migrate to this software support if you have a stand-alone environment, an IBM tape library environment, or an OAMplex with objects stored in an IBM tape library. It also provides guidelines for using the coexistence and enabling PTFs.

Table 1 shows the subtasks and associated procedures for migrating to the software support for the Model E1x and Model H1x tape drives.

Table 1. Task Roadmap for Migrating to z/OS DFSMS Software Support for 3590 Models E1x/H1x Tape Drives

If you are installing the following hardware:	Perform these software migration subtasks:	And refer to these procedures:
Model E1x or Model H1x tape drives in a stand-alone environment	Understand coexistence considerations.	"Understanding Coexistence Considerations for a Stand-Alone Environment" on page 10
	Prepare for installation of the software.	"Preparing for Installation in a Stand-Alone Environment" on page 10
	Install the appropriate PTFs.	"Installing Software PTFs" on page 15
Model E1x or Model H1x tape drives in an IBM tape library environment	Evaluate your current environment.	"Evaluating the IBM Tape Library Environment" on page 11
	Understand coexistence considerations.	"Understanding IBM Tape Library Coexistence Considerations" on page 12
	Prepare for installation of the software.	"Preparing for Installation in an IBM Tape Library Environment" on page 13
	Install the appropriate PTFs.	"Installing Software PTFs" on page 15
Model E1x or Model H1x tape drives in an OAMplex	Take into account coexistence considerations.	"Coexistence Considerations in an OAMplex" on page 15

Migrating in a Stand-Alone Environment

Before you install the software support for the 3590 Model E1x and H1x tape drives in your stand-alone environment, you need to understand coexistence considerations for stand-alone drives and prepare your stand-alone systems for installation.

Understanding Coexistence Considerations for a Stand-Alone Environment

As described in Chapter 1, “Introduction” on page 1, z/OS DFSMS and related program products provide full software support for Model E1x tape drives and Model H1x tape drives. This full support allows the tape drives to operate in a stand-alone environment in either 3590 Model B1x or 3490E emulation. It enables Model E1x tape drives and Model H1x tape drives to operate in 3590-1 or 3490E emulation mode and to coexist with real 3590 Model B1x or 3490E tape drives.

The full software support for the 3590 Model E1x tape drive is available on systems with DFSMS/MVS 1.4.0 and above. Full support for the 3590 Model H1x tape drive is available on systems with DFSMS/MVS 1.5.0 and above. The z/OS DFSMS full software support is packaged into program temporary fixes (PTFs), including coexistence PTFs and an enabling PTF. See the PSP bucket for lists of the PTF and APAR numbers applicable for each device.

You must install coexistence PTFs on lower-level stand-alone drives that have DFSMS/MVS 1.4.0 and 1.5.0 installed, as appropriate. See “Installing Software PTFs” on page 15 for more information on using PTFs to enable this software support.

Attention: Operator commands display the new 384TRACK and 3590-H values only on systems that interface with and support the new 3590 Model H1x devices.

Preparing for Installation in a Stand-Alone Environment

Perform the following steps to prepare for installation of the software support for the 3590 Model E1x and H1x tape drives in a stand-alone environment.

- ___ Step 1. Install the enabling PTF that is appropriate for the device and system level.
- ___ Step 2. Run hardware configuration definition (HCD) to define the tape drives to MVS. You must define Model E1x or Model H1x tape drives as 3590-1 or 3490E drives.
- ___ Step 3. Perform an initial program load (IPL) or use the ACTIVATE command to reference the resulting IODF and LOADxx member in SYS1.PARMLIB.

Note: Multiple virtual storage configuration program (MVSCP) does not support Model E1x tape drives or Model H1x tape drives.

- ___ Step 4. Verify that you set DEVSUPxx **VOLNSNS=YES** to ensure that a 256-track volume is available to a 128-track device, and that a 384-track volume is available to a 128-track or a 256-track device. This allows you to reuse volumes that were written in 256TRACK and 384TRACK formats on lower-level devices.
- ___ Step 5. Specify an appropriate system- or user-defined esoteric to allocate to the correct set of devices.
- ___ Step 6. Put coexistence PTFs on the applicable systems to prevent lower-level systems (those that do not have the 3590 Models E1x/H1x tape drives software installed) from using the devices.

For additional information on migrating to the software support for the 3590 Model E1x and H1x tape drives, see *z/OS DFSMS Migration*.

Migrating in an IBM Tape Library Environment

Before you install the software support for the 3590 Model E1x and H1x tape drives in your manual tape library (MTL) or automated tape library (ATL) environment, you need to evaluate your current environment, understand coexistence considerations for tape libraries, and prepare your library for installation.

Evaluating the IBM Tape Library Environment

Evaluate your current environment by identifying the following items:

- The MTLs or ATLs in which you will install the drives
- All systems attached to these libraries
- All shared tape configuration databases (TCDBs) associated with these libraries
- All systems connected to these shared TCDBs

Let's consider the system configuration depicted in Figure 2 on page 12 as an example. Scenario 2 describes the software levels installed on the various systems.

Scenario 2: One TCDB, Two ATLs, Three Systems
This configuration includes a 3494 automated tape library sysplex with three systems sharing a single TCDB. System A runs OS/390 V2R10, System B runs z/OS V1R1, and System C runs z/OS V1R3. The shared TCDB is associated with two 3494 ATLs, which are identified to contain Model H1x tape drives.

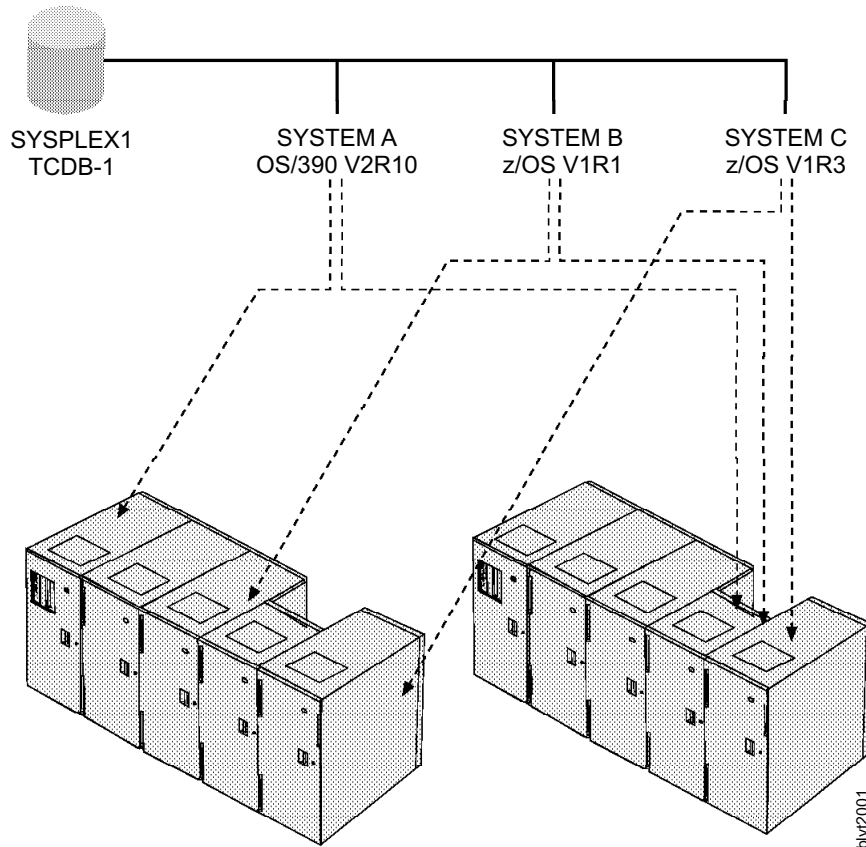


Figure 2. Sysplex with Two 3494 Automated Tape Libraries

Based on this scenario, all of the systems are able to use the full support provided with the z/OS DFSMS 3590 Model H1x software; however, coexistence PTFs may still be needed if one or more of the systems will not have all of the full support PTFs installed.

Understanding IBM Tape Library Coexistence Considerations

As described in Chapter 1, “Introduction” on page 1, z/OS DFSMS and related program products provide full software support for Model E1x tape drives and Model H1x tape drives in an IBM tape library environment. This full support allows the tape drives to operate in an MTL or ATL as 3590 Model B1x devices, providing device allocation and tape media management support. It enables Model E1x tape drives and Model H1x tape drives to operate in 3590-1 emulation mode and to coexist with real 3590 Model B1x tape drives in the same tape library.

The full software support for the 3590 Model E1x tape drive is available on systems with DFSMS/MVS 1.4.0 and above. Full support for the 3590 Model H1x tape drive is available on systems with DFSMS/MVS 1.5.0 and above. The z/OS DFSMS full software support is packaged into program temporary fixes (PTFs), including coexistence PTFs and an enabling PTF. See the PSP bucket for lists of the PTF and APAR numbers applicable for each device.

Coexistence support is provided to prevent the 3590 Model E1x and H1x devices from coming online on a system that does not support these devices or that does not have all of the full support PTFs installed. You must install the coexistence

support on systems that share an IBM tape library with the new device types and on systems that share the TCDB containing those up-level tape volumes.

Attention: Operator commands display the new 384TRACK and 3590-H values only on systems that interface with and support the new 3590 Model H1x devices.

Preparing for Installation in an IBM Tape Library Environment

Perform the following steps to prepare for installation of the software support for the 3590 Model E1x and H1x tape drives in an ATL environment.

- ___ Step 1. Install the enabling PTF that is appropriate for the device and system level.
- ___ Step 2. Run hardware configuration definition (HCD) to define the tape drives to MVS. You must define Model E1x or Model H1x tape drives as 3590-1 drives.
- ___ Step 3. Perform an initial program load (IPL) or use the ACTIVATE command to reference the resulting IODF and LOADxx member in SYS1.PARMLIB

Note: Multiple virtual storage configuration program (MVSCP) does not support Model E1x tape drives or Model H1x tape drives.

- ___ Step 4. Define or alter existing storage group constructs to include libraries using the new devices.
- ___ Step 5. Define or alter existing data class constructs to include the new recording technology.
- ___ Step 6. Create or alter automatic class selection routines to select the appropriate SMS constructs.
- ___ Step 7. Validate and activate the modified source control data sets (SCDSs) that use the new SMS constructs.
- ___ Step 8. Create or alter installation exits, including cartridge entry, cartridge eject, change use attribute, and volume-not-in-library, to process the new recording technology. See *z/OS DFSMS OAM Planning, Installation, and Storage Administration Guide for Tape Libraries* for specific instructions on modifying these installation exits.
- ___ Step 9. Verify that you set DEVSUPxx **VOLNSNS=YES** to ensure that a 256-track volume is available to a 128-track device, and that a 384-track volume is available to a 128-track or a 256-track device. This allows you to reuse volumes that were written in 256TRACK and 384TRACK formats on lower-level devices.
- ___ Step 10. Add new esoteric names to JES3 initialization decks.
- ___ Step 11. Put coexistence PTFs on the applicable systems to prevent lower-level systems (those that do not have the 3590 Models E1x/H1x tape drives software installed) from using the devices.
- ___ Step 12. Determine whether you need to specify the cartridge media type (MEDIA3 or MEDIA4) and the track recording technology (256TRACK or 384TRACK) through the DATACLAS construct name or through the dynamic allocation (DALINCHG) parameter:
 - ___ Step a. Whenever possible, use an installation-defined DATACLAS construct name to control cartridge media type and track recording technology. If, however, your application must control the media type and the recording technology due to its dynamic nature, and it is not possible to use a predefined DATACLAS construct, then you must use the

DALINCHG parameter to specify the cartridge media type and the track recording technology.

- ___ Step b. In a system-managed tape library, the DALINCHG parameter specifies the media type and recording technology of the new tape drive. The first number in the parameter indicates the track density, with “4” representing 256-track and “5” representing 384-track. The second number in the parameter indicates the media type, with “3” representing MEDIA3 and “4” representing MEDIA4. Contact your system administrator before changing the DALINCHG parameter.
- ___ Step 13. Based on your assessment in the previous step, define the DATACLAS construct to set the cartridge media type and recording technology, **or** change the SVC 99 DALINCHG parameter value to one of the values listed in Table 2:

Table 2. Dynamic Allocation (DALINCHG) Parameter Values

Parameter Value	Media Type	Track Size
43	MEDIA3	256-track
44	MEDIA4	256-track
53	MEDIA3	384-track
54	MEDIA4	384-track

Attention: The specification of DALINCHG is ignored if a non-system-managed tape volume is allocated. See *z/OS MVS Programming: Authorized Assembler Services Guide* for more information about the DALINCHG parameter.

- ___ Step 14. If your installation is upgrading all of its existing 3590 Model B1x or 3590 Model E1x drives, or both, to 3590 Model H1x drives, set the read-compatible indicator in the TDSI field of the volume record. Once this attribute is set, it remains set until the volume is returned to scratch.

You can set this special attribute field in either of the following ways:

- ___ Step a. Set the special attribute indicator through the cartridge entry installation exit (CBRUXENT). Refer to *z/OS DFSMS OAM Planning, Installation, and Storage Administration Guide for Tape Libraries*.
- ___ Step b. Set the **SPECIALATTRIBUTE** parameter in the ALTER VOLUMEENTRY service to **READCOMPATIBLE**. See “ALTER VOLUMEENTRY” on page 19.

If you want to request read-compatibility for a single use of the volume, specify the following on your JCL DD statement:

LABEL=(, , IN)

Attention: If you do not set the read-compatible indicator as outlined above, a request to read an existing 128-track or 256-track volume on a Model H1x tape drive will fail, with no devices being considered eligible for the request.

For additional information on migrating to the software support for the 3590 Model E1x and H1x tape drives, see *z/OS DFSMS Migration*.

Coexistence Considerations in an OAMplex

For OAM's object support customers, in addition to the planning steps required for migration to the software support for the 3590 Model E1x and H1x tape drives in the stand-alone and IBM tape library environments, there are coexistence considerations your installation must take into account before you install the software in an OAMplex:

- OAM coexistence support prevents lower-level systems from selecting volumes with new EPI values for object write requests.
- If you are running OAM Object support in an OAMplex where at least one system has the full 3590 Model H1x software support installed and enabled and at least one system is at a release level where the new 3590 Model H1x devices are supported, but all of the support is not installed and enabled, then you must consider the following coexistence items:
 - A system that does not support the new 3590 Model H1x devices may receive a retrieve request for an object that resides on a volume that was written in 384-track format by a 3590 Model H1x device. In this case, coexistence support is available so that OAM attempts to locate an OAM instance in the OAMplex where the full support is installed and enabled. If an OAM instance that can process the request is found, the OAM on the system where the request originated ships the retrieve request to the target system through cross-system coupling facility (XCF) messaging services.
 - You must make the new 3590 Model H1x devices available to all OAM instances in an OAMplex where the full software support is installed and enabled. Once OAM uses the new 3590 Model H1x devices to write objects to tape volumes with the new EPI value recorded, this support requires that all OAM instances that have the full support installed have access to drives which can process requests using those volumes.

Installing Software PTFs

The coexistence PTFs and the enabling PTF allow systems to distinguish between the real 3590 Model B1x tape drives and the emulated ones, and between the real 3490E tape drives and the emulated ones. Installing the enabling PTF appropriate to the device provides you with full device support. Installing the coexistence PTFs prevents systems that do not have the full support installed from bringing the devices online.

Rule: Before installing the enabling PTF on all systems in a sysplex, you must first install the appropriate coexistence PTFs. The prerequisite coexistence PTFs are designed to prevent systems on which they are installed from varying Model E1x tape drives or Model H1x tape drives online. Separate coexistence PTFs are available for the 3590 Model E1x devices to prevent the system from bringing a 3590 Model E1x device online in an IBM tape library environment. The 3590 Model H1x coexistence support prevents the system from bringing a 3590 Model H1x device online in an IBM tape library or in a stand-alone environment. The coexistence support for the 3590 Model H1x device is built into the device services full support PTF. Installation of this PTF without the enabling PTF provides this coexistence support. At the DFSMS/MVS 1.4.0 level, a separate coexistence PTF is available.

See Scenario 4 for details on installing only the coexistence PTF on one system without the enabling PTF.

Follow the instructions in the product support plan (PSP) bucket or in the PTF text to install the appropriate coexistence PTFs and the appropriate enabling PTF.

Scenario 3 shows the enabling PTF installed on all systems in a sysplex; this scenario is illustrated in Figure 3. Scenario 4 shows only the coexistence PTFs installed on one system; this scenario is illustrated in Figure 4 on page 18.

Scenario 3: Enabling PTF Installed on All Systems
--

Figure 3 shows that you installed the 3590 Model H1x enabling PTF on Systems A, B, and C . As a result, you can fully use the new drives from all three systems.

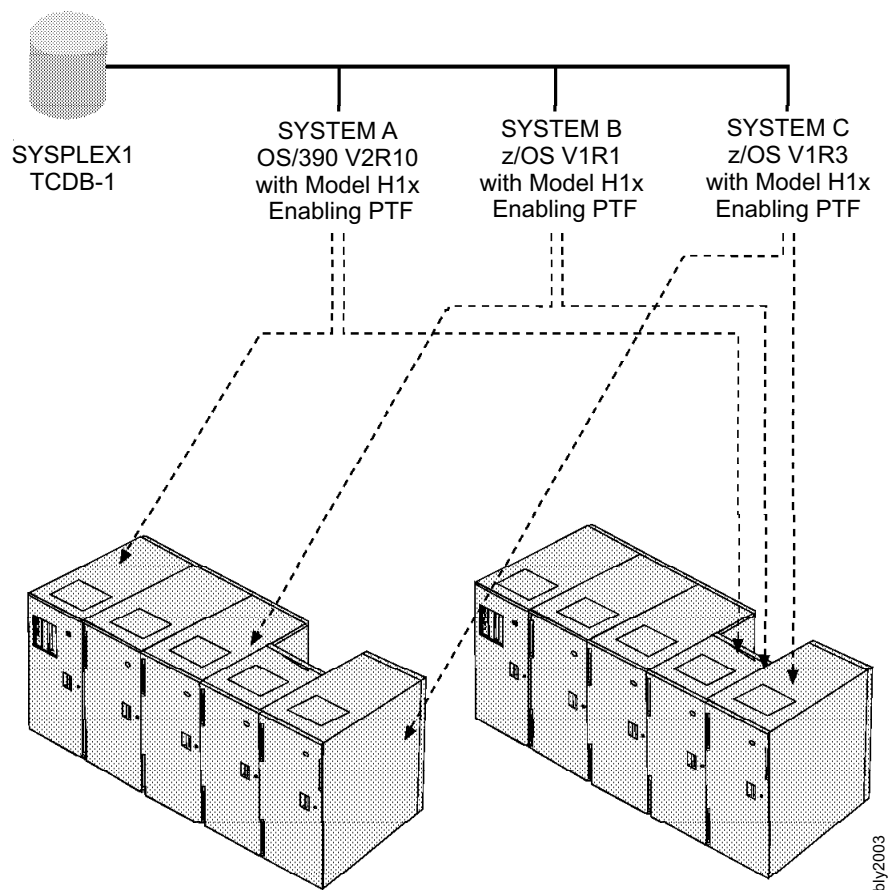


Figure 3. All Systems in a Sysplex with the Enabling PTF Installed

Scenario 4: Only the Coexistence PTF Installed on One System in a Sysplex

Figure 4 on page 18 shows that you installed the enabling PTF on **System B** and **System C**, while **System A** has only the coexistence PTF. As a result, you will be able to fully exploit Model H1x tape drives from **System B** and **System C**, but not from **System A**. The coexistence PTF installed on **System A** enables you to use the system normally. However, it does not allow you to vary the drives online.

Attention: It is critical for you to install the coexistence PTF on **System A** *before* you exploit Model H1x functions from **System B** and **System C**, as shown in Figure 4 on page 18. Failure to install this coexistence PTF will introduce a wide range of serious problems, such as the loss of system access to tape data.

Without the coexistence PTF installed, **System A** cannot distinguish between a Model H1x tape drive and Model B1x tape drive. It can allocate a volume to a Model H1x tape drive which records data with 384 tracks, but it “thinks” that the allocated drive is a Model B1x tape drive and indicates 128TRACK as the recording technology in the TCDB volume record.

Let’s suppose that **System B** now allocates the same volume for updating. It sees the 128TRACK recording technology in the TCDB volume record and subsequently allocates this volume to a Model B1x tape drive. The drive cannot read data from the volume, and the job fails.

When problems like this occur, you must identify all volumes with TCDB volume records that contain the incorrect recording technology value and use the AMS ALTER command to correct these records. Refer to “ALTER VOLUMEENTRY” on page 19 for the details of this command.

Other problems, such as DDR swaps to inappropriate devices, can also occur.

Rule: To prevent these and other problems, you must install the coexistence PTF on **System A** *before* you use Model H1x drives from **System B** and **System C**.

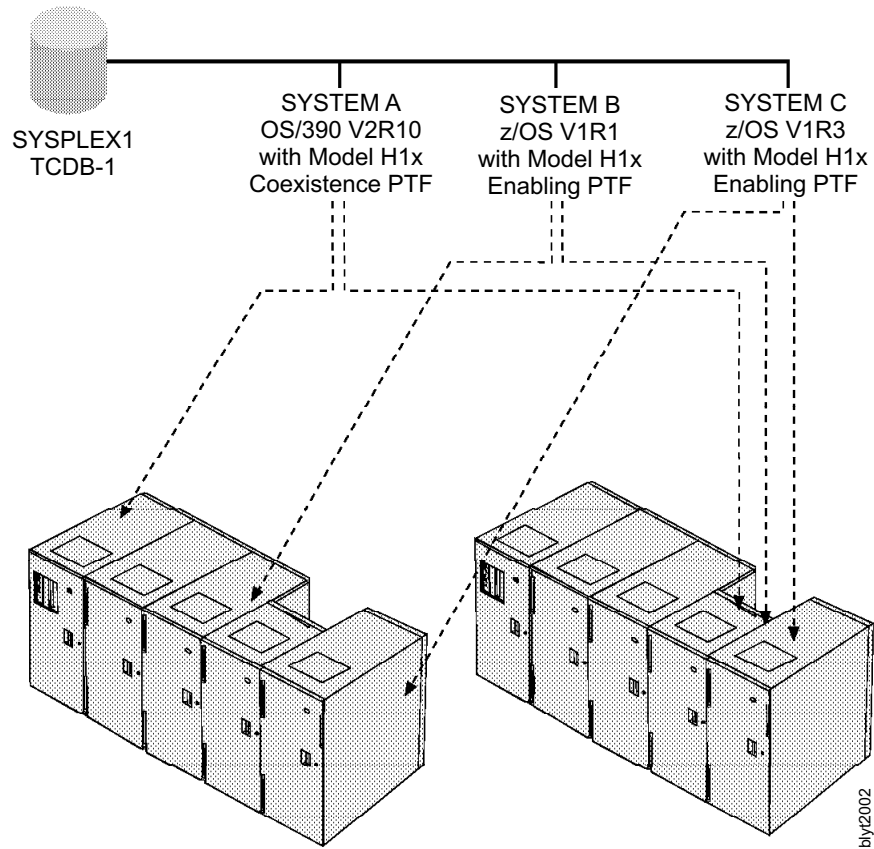


Figure 4. One System in a Sysplex with Only the Coexistence PTF Installed

Chapter 3. AMS Modifications

This chapter outlines changes to access method services (AMS) in support of the Model E1x tape drive and the Model H1x tape drive. Specifically, it describes the modifications to the following AMS commands:

- ALTER VOLUMEENTRY
- CREATE VOLUMEENTRY
- LISTCAT

The **RECORDING** parameter of the ALTER VOLUMEENTRY and CREATE VOLUMEENTRY commands includes a new subparameter, 384TRACK, in support of the Model H1x tape drive. These changes enable AMS to specify the new 384-track recording technology for TCDB volume records. In addition, you can select the 256TRACK subparameter to record on a Model E1x tape drive or the 128TRACK subparameter to record on a Model B1x tape drive.

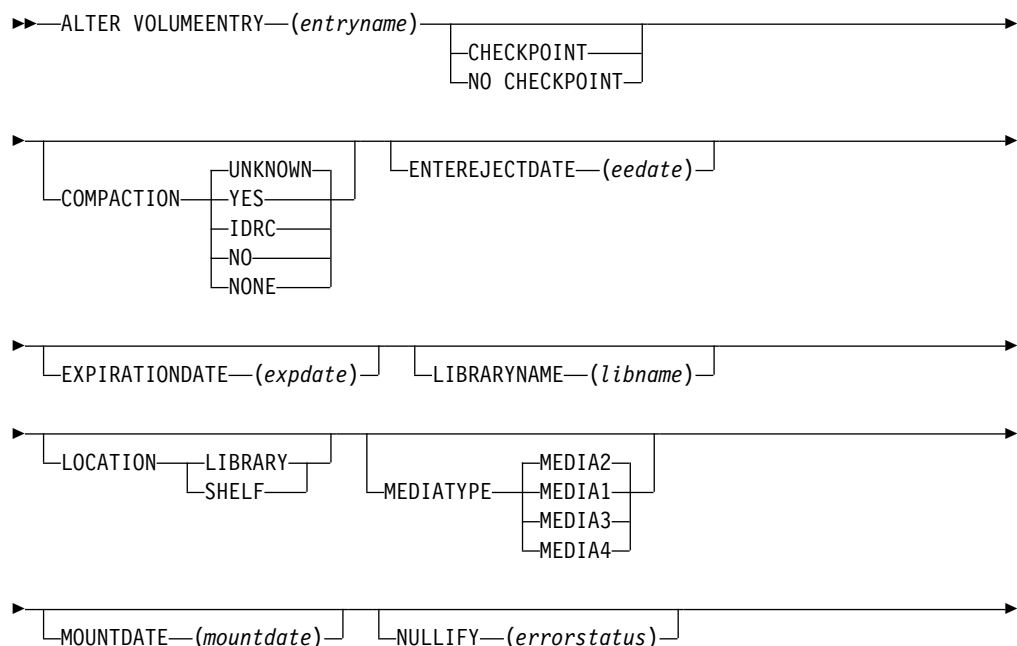
ALTER VOLUMEENTRY

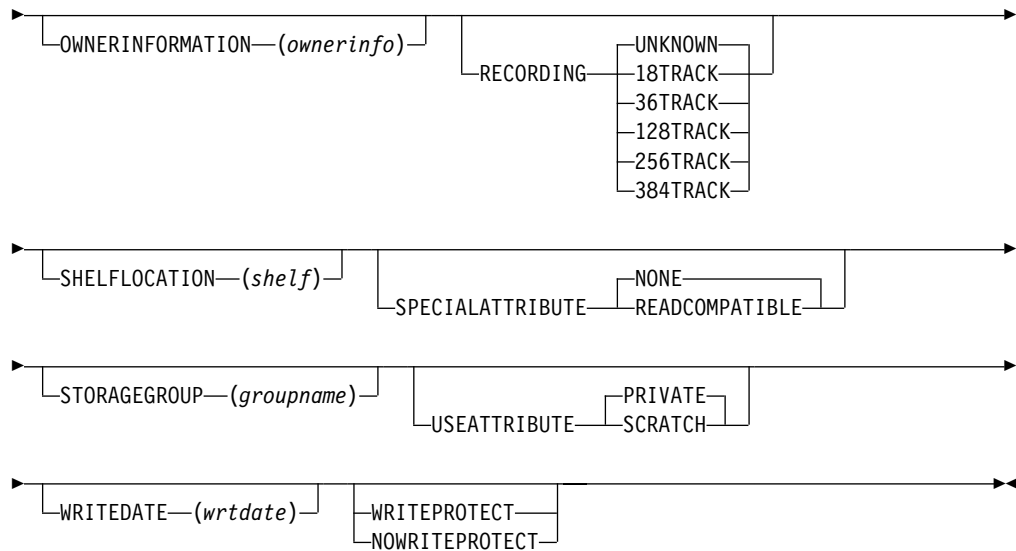
The access method services ALTER VOLUMEENTRY command modifies the attributes of an existing tape volume entry.

Attention: Use this command to recover from tape volume catalog errors only. Because AMS cannot change the library manager inventory in an automated tape library, use ISMF for normal tape library alter functions.

ALTER VOLUMEENTRY Command Syntax

The syntax of the ALTER VOLUMEENTRY command is as follows:





ALTER VOLUMEENTRY Parameters

As shown below, the optional **RECORDING** parameter includes the subparameters of 256TRACK and 384TRACK for support of the Model E1x tape drive and the Model H1x tape drive. For explanations of the other parameters that are used in the ALTER VOLUMEENTRY command, refer to *z/OS DFSMS Access Method Services*.

[RECORDING{18TRACK|36TRACK|128TRACK|256TRACK|384TRACK|UNKNOWN}]

Identifies the tape recording technology. This parameter can be used for private tape volumes only. The default for scratch tape volumes is UNKNOWN.

18TRACK Tape was written on an 18-track device and must be read on an 18-track device or a 36-track device.

36TRACK Tape was written and must be read on a 36-track device.

128TRACK Tape was written on a 128-track device and must be read on a 128-track, 256-track, or 384-track device.

256TRACK Tape was written on a 256-track device and must be read on a 256-track device or a 384-track device.

Note: 128TRACK and 256TRACK are valid with **MEDIATYPE(MEDIA3)** or **MEDIATYPE(MEDIA4)** only.

384TRACK Tape was written and must be read on a 384-track device.

Note: 384TRACK is valid with **MEDIATYPE(MEDIA3)** or **MEDIATYPE(MEDIA4)** only.

UNKNOWN Tape recording technology is unknown. This is the default value for scratch tape volumes.

Abbreviation: REC

Altering a VOLUME Entry: Example

This example of the ALTER VOLUMEENTRY command alters the entry name that describes volume 0A2991:

```
//ALTERVOL JOB ...
//STEP1 EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=A
//SYSIN DD *
      ALTER VOLUMEENTRY(V0A2991)-
            LIBRARYNAME(ATLIB02)-
            USEATTRIBUTE(SCRATCH)-
            MEDIATYPE(MEDIA4)-
            RECORDING(384TRACK)
```

The parameters that are used in this example are as follows:

- ALTER VOLUMEENTRY indicates that an entry that describes a single volume in a library is being altered.
- V0A2991 specifies that the name of the volume being altered is V0A2991 and that the *volser* is 0A2991.
- LIBRARYNAME specifies that the name of the library with which this volume record is associated is ATLIB02.
- USEATTRIBUTE identifies the volume as being a SCRATCH tape.
- MEDIATYPE specifies the media type as MEDIA4.
- RECORDING specifies the recording technology as 384TRACK.

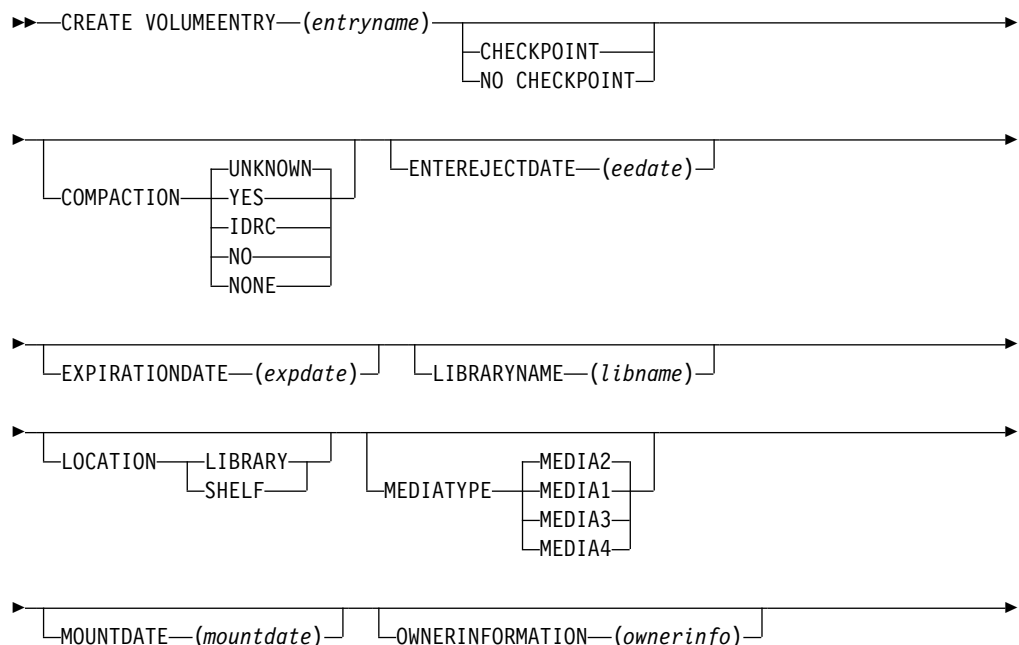
CREATE VOLUMEENTRY

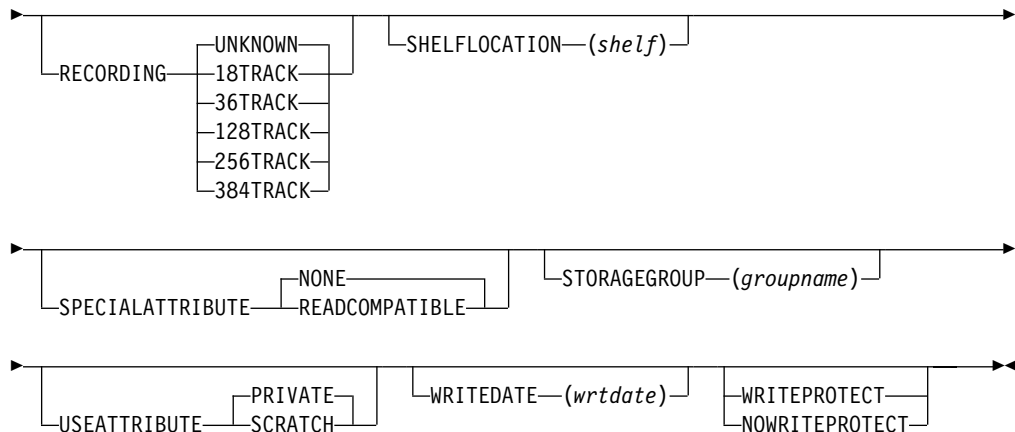
The AMS CREATE VOLUMEENTRY command creates tape volume entries.

Attention: Use this command to recover from tape volume catalog errors only. Because AMS cannot change the library manager inventory in an automated tape library, use ISMF for normal tape library create functions.

CREATE VOLUMEENTRY Command Syntax

The syntax of the CREATE VOLUMEENTRY command is as follows:





CREATE VOLUMEENTRY Parameters

As shown below, the optional **RECORDING** parameter includes the subparameters of 256TRACK and 384TRACK for support of the Model E1x tape drive and the Model H1x tape drive. For explanations of the other parameters that are used in the CREATE VOLUMEENTRY command, refer to *z/OS DFSMS Access Method Services*.

[RECORDING{18TRACK|36TRACK|128TRACK|256TRACK|384TRACK|UNKNOWN}]

Identifies the tape recording technology. This parameter can be used for private tape volumes only. The default for scratch tape volumes is UNKNOWN.

18TRACK

Tape was written on an 18-track device and must be read on an 18-track device or a 36-track device.

36TRACK

Tape was written and must be read on a 36-track device.

128TRACK

Tape was written on a 128-track device and must be read on a 128-track, 256-track, or 384-track device.

256TRACK

Tape was written on a 256-track device and must be read on a 256-track device or a 384-track device.

Notes:

1. 128TRACK and 256TRACK are valid with **MEDIATYPE(MEDIA3)** or **MEDIATYPE(MEDIA4)** only.
2. The system uses the 128TRACK subparameter by default if you specify MEDIA3 or MEDIA4 for the **MEDIATYPE** without defining a **RECORDING** parameter.

384TRACK

Tape was written and must be read on a 384-track device.

Notes:

1. 384TRACK is valid with **MEDIATYPE(MEDIA3)** or **MEDIATYPE(MEDIA4)** only.
2. The system uses the 128TRACK subparameter by default if you specify MEDIA3 or MEDIA4 for the **MEDIATYPE** without defining a **RECORDING** parameter.

UNKNOWN

Tape recording technology is unknown. This is the default value for scratch tape volumes.

Abbreviation: REC

Creating a VOLUME Entry: Example

This example of the CREATE VOLUMEENTRY command creates a volume entry for volume 0A2991:

```
//CREATVOL JOB ...
//STEP1 EXEC PGM=IDCAMS
//SYSPRINT DD SYSOUT=A
//SYSIN DD *
CREATE VOLUMEENTRY(V0A2991)-
    LIBRARYNAME(ATLIB02)-
    USEATTRIBUTE(SCRATCH)-
    MEDIATYPE(MEDIA4)-
    RECORDING(384TRACK)
```

The parameters used in this example are as follows:

- CREATE VOLUMEENTRY indicates that an entry describing a single volume in a library is being created.
- V0A2991 specifies that the name of the volume entry being created is V0A2991 and the *volser* is 0A2991.
- LIBRARYNAME specifies that the name of the library with which this volume record is associated is ATLIB02.
- USEATTRIBUTE identifies the volume as being a SCRATCH tape.
- MEDIATYPE specifies the media type as MEDIA4.
- RECORDING specifies the recording technology as 384TRACK.

LISTCAT

The AMS LISTCAT command lists catalog entries.

LISTCAT Command Syntax

The syntax for the LISTCAT command does not change with the addition of the 256TRACK or 384TRACK subparameters. The syntax is as follows:

```
LISTCAT [ALIAS]
        [ALTERNATEINDEX]
        [CLUSTER]
        [DATA]
        [GENERATIONDATAGROUP]
        [INDEX]
        [LIBRARYENTRIES(libent)]
        [NONVSAM]
        [PAGESPACE]
        [PATH]
        [USERCATALOG]
        [VOLUMEENTRIES(volent)]
        [CREATION(days)]
        [ENTRIES(entryname[/password][entryname[/password]...])|LEVEL(leve)]
        [EXPIRATION(days)]
```

```
[FILE(ddname)]
[LIBRARY(libname)]
[NAME|HISTORY|VOLUME|ALLOCATION|ALL]
[OUTFILE(ddname)]
[CATALOG(catname)]
```

LISTCAT Parameters

The volume recording technology and media type are not parameters that can be specified with the LISTCAT command. For explanations of the parameters used in the LISTCAT command, refer to *z/OS DFSMS Access Method Services*.

List Tape Volume Entries: Sample Output

The LISTCAT command displays the value for the **RECORDING** parameter as part of the volume data. The value for the Model E1x tape drive volume entries is 256TRACK and the value for the Model H1x tape drive volume entries is 384TRACK. Figure 5 shows 384TRACK as the recording technology used with volume 0A2991.

To see additional examples of how to get the output you want, refer to *z/OS DFSMS Access Method Services*.

This example of the LISTCAT command lists all volumes in the ATLIB02 library catalog. The command returns catalog data for only one volume with a volume *entryname* of V0A2991.

```
LISTCAT -
  VOLUMEENTRIES
  ALL
IDCAMS  SYSTEM SERVICES          TIME: 11:29:12      04/02/02      PAGE      2
                                LISTING FROM CATALOG -- SYS1.VOLCAT.V0
VOLUME-ENTRY----V0A2991
  DATA-VOLUME
    LIBRARY-----ATLIB02      RECORDING-----384TRACK      ERROR-STATUS-----NOERROR      CREATION-DATE-2002-04-02
                                MEDIA-TYPE-----MEDIA4      USE-ATTRIBUTE-----SCRATCH      ENT-EJ-DATE----- (NULL)
    STORAGE-GROUP---*SCRCH*    COMPACTION----- (YES)      WRITE-PROTECTED--- (NULL)      LAST-MOUNTED----- (NULL)
    CHECKPOINT----- (NULL)    SP-ATTRIBUTE-----NONE      LAST-WRITTEN----- (NULL)
    LOCATION-----LIBRARY      SHELF-LOC----- (NULL)      EXPIRATION----- (NULL)
    OWNER----- (NULL)
IDCAMS  SYSTEM SERVICES          TIME: 11:29:12      04/02/02      PAGE      3
                                LISTING FROM CATALOG -- SYS1.VOLCAT.VGENERAL
  THE NUMBER OF ENTRIES PROCESSED WAS:
    AIX -----0
    ALIAS -----0
    CLUSTER -----0
    DATA -----0
    GDG -----0
    INDEX -----0
    NONVSAM -----0
    PAGESPACE -----0
    PATH -----0
    SPACE -----0
    USERCATALOG -----0
    TAPELIBRARY -----0
    TAPEVOLUME -----1
    TOTAL -----1
  THE NUMBER OF PROTECTED ENTRIES SUPPRESSED WAS 0
IDC0001I FUNCTION COMPLETED, HIGHEST CONDITION CODE WAS 0
IDCAMS  SYSTEM SERVICES          TIME: 11:29:12      04/02/02      PAGE      4
IDC0002I IDCAMS PROCESSING COMPLETE. MAXIMUM CONDITION CODE WAS 0
```

Figure 5. LISTCAT Output

The parameters used in this example are as follows:

- VOLUMEENTRIES specifies that information relating to tape volume entries for all volumes in the library are be listed.
- ALL requires that all information that is associated with the tape volume entries is to be listed.
- LIBRARY specifies that only tape volume entries that are associated with the tape library named ATLIB02 are to be listed.

Chapter 4. Tape Drive and Tape Volume Allocation Modifications

In support of the Model E1x tape drive and the Model H1x tape drive, changes made to device support, storage management subsystem (SMS), and Multiple Virtual Storage (MVS) device allocation allow you to allocate the tape drives and tape volumes. Within an IBM tape library environment, your system can fully recognize all supported media types and recording technologies. This chapter explains these changes in the following sections:

- Device support
- SMS
- MVS device allocation

Device Support

z/OS DFSMS device support provides hardware device-specific code, which allows tape drives, tape volumes, and DASD to interface with z/OS DFSMS. Specifically, it provides:

- Interfacing exits to input/output supervisor (IOS) and EXCP device support code
- Error recovery procedure routines
- Services for acquiring and logging statistical and error data
- Services for acquiring and displaying device states
- Utilities, such as for initializing tapes

DEVSERV QTAPE

You can use the MVS DEVSERV command to request basic status information on a device, a group of devices, or storage control units. You can use the QTAPE parameter of the DEVSERV command to display tape device information.

With the DEVSERV QTAPE MED (medium) option, you can display information for the device type, media type, and cartridge volume serial number.

The syntax of the DEVSERV QTAPE command with the MED option is as follows:

DS QT,xxx,MED,nnn

xxx

Represents a three- or four-digit device number in hexadecimal.

nnn

Stands for the number of devices, starting at the address 'xxx', for which the DEVSERV command displays the MED information. *nnn* is optional and can be any decimal number from 1 to 256, with 1 as the default.

See *z/OS MVS System Commands* for more information on the DEVSERV QTAPE command.

Figure 6 on page 28 shows the display content when you issue the DEVSERV QTAPE MED command.

```

-----
----      DS QT MED Display Content      ----
-----

IEE459I          DEVSERV QTAPE
UNIT RDTYPE EDTYPE EXVLSR INVLSR RMEDIA EMEDIA X

```

Figure 6. DEVSERV QTAPE MED Display Content

X UNIT - tape device address
 RDTYPE - real device type
 EDTYPE - emulated device type
 EXVLSR - external volume serial of cartridge
 INVLSR - internal volume serial of cartridge
 RMEDIA - real media type of the volume mounted on the drive
 EMEDIA - emulated media type of the volume mounted on the drive

Notes:

1. EDTYPE, EXVLSR, INVLSR, RMEDIA, and EMEDIA is blank if information is not available.
2. Valid values for RMEDIA and EMEDIA are:

- 1=CST
- 2=EC-CST
- 3=3590 STD length tape
- 4=3590 EXT length tape

RMEDIA and EMEDIA is blank when the media type is not defined or cannot be determined.

The following are sample output and messages of the DEVSERV QTAPE command with the MED option.

Figure 7 shows the output of DS QT,940,MED when a 3590 Model E1x tape drive emulates a 3590 Model B1x tape drive.

```

IEE459I 11.32.31 DEVSERV QMEDIUM 608
UNIT RDTYPE EDTYPE EXVLSR INVLSR RMEDIA EMEDIA
0940 3590-E 3590-1 003700          3      3

```

Figure 7. DS QT,940,MED Output

Figure 8 shows the output of DS QT,DA0,MED when the device is a 3490E drive.

```

IEE459I 11.32.31 DEVSERV QMEDIUM 608
UNIT RDTYPE EDTYPE EXVLSR INVLSR RMEDIA EMEDIA
0DA0 3490          2

```

Figure 8. DS QT,DA0,MED Output

Figure 9 on page 29 displays the message that you receive if the input device address is valid, but the device is not a Model B1x, Model E1x, Model H1x, or 3490E drive.

```

IEE459I 11.32.31 DEVSERV QMEDIUM 608
UNIT RDTYPE EDTYPE EXVLSR INVLSR RMEDIA EMEDIA
**** UNLISTED DEVICE(S) AND REASON CODES :
      0B60(10) Y
**** (10) - UNSUPPORTED DEVICE TYPE

```

Figure 9. DS QT,B60,MED Message

Y Reason Code 10, UNSUPPORTED DEVICE TYPE, is shown when the device type given is not a Model B1x, Model E1x, Model H1x, or 3490E drive.

Figure 10 shows the message that you receive if the input device address and device type are valid, but the device is not ready.

```

IEE459I 11.32.31 DEVSERV QMEDIUM 608
UNIT RDTYPE EDTYPE EXVLSR INVLSR RMEDIA EMEDIA
**** UNLISTED DEVICE(S) AND REASON CODES :
      0DA0(11) Z
**** (11) - DEVICE NOT READY

```

Figure 10. DS QT,DA0,MED Message

Z Reason Code 11, DEVICE NOT READY, is shown when no volume is mounted on the drive.

Figure 11 shows the output for DS QT,960,MED when the Model H1x tape drive is emulating a 3590-1 device.

UNIT	RDTYPE	EDTYPE	EXVLSR	INVLSR	RMEDIA	EMEDIA
0960	3590-H	3590-1		100000	4	4

Figure 11. DS QT,960,MED Output

Figure 12 shows the output for DS QT,970,MED when the Model H1x tape drive is emulating a 3490 device.

UNIT	RDTYPE	EDTYPE	EXVLSR	INVLSR	RMEDIA	EMEDIA
0970	3590-H	3490		100000	4	2

Figure 12. DS QT,970,MED Output

Message Display

The message display facility displays messages on tape drive pods. Its interface is enhanced to allow you to indicate if you want to index the Automatic Cartridge Loader (ACL).

Indexing is an ACL ability to insert cartridges loaded in ACLs directly into tape drives. As a result, human intervention is no longer needed when a tape drive with a loaded ACL is allocated to a scratch mount request. This only applies when the ACL is in system mode.

The MSGDISP macro displays messages on tape drive pods. The MSGDISP macro syntax is as follows:

<i>[label]</i>	MSGDISP MOUNT
	UCB=(reg),
	LABEL='S' 'A' 'N' 'X' addr,
	SER='volser' addr,
	INDEX=YES NO,
	WAIT=YES NO,
	TEST=YES NO,
	MF=L (E,addr)

As you can see, the MSGDISP macro includes the **INDEX** keyword.

INDEX=YES|NO

specifies whether the ACL should be indexed to satisfy a scratch mount request. **INDEX=YES** is the default.

YES

specifies that indexing should be done if:

- The ACL is present and loaded, and
- The request is for SCRTCH or PRIVAT.

NO

specifies that indexing should not be done regardless of the state of the ACL.

Note: The **INDEX** keyword is only valid with the following MSGDISP functions:

- MOUNT
- DEMOUNT
- GEN

MSGDISP using the INDEX Keyword

Figure 13 illustrates the MSGDISP GEN function with the **INDEX** keyword. As you can see, using **INDEX** causes the ACL to be indexed for a scratch mount.

MSGDISP GEN,	GENERAL FUNCTION	X
UCB=(RUCB12),	UCB ADDRESS IN REGISTER 12	X
INDEX=YES,	INDEX THE ACL	X
TXT=IEC701,	1ST ALTERNATING MESSAGE	X
TXT2=VOLSERM,	2ND ALTERNATING MESSAGE	X
VOL=INSERT,	DISPLAY UNTIL DEVICE READY	X
FLASH=ALT,	ALTERNATE THE MESSAGE	X
WAIT=NO,	DON'T WAIT FOR I/O TO COMPLT	X
MF=(E,MSGDLST)		

Figure 13. MSGDISP GEN Example

See *z/OS DFSMSdfp Advanced Services* for more information on MSGDISP macro functions.

SMS

SMS automates and centralizes storage management. It automatically assigns service requirements and attributes to new data when that data is created. SMS configuration services validates, for example, the recording technology value that ISMF specifies in data class definitions.

ISMF enables you to specify a value of 256 for the Model E1x tape drive recording technology attribute. It also allows you to specify a value of 384 for the Model H1x tape drive recording technology attribute. In support of the tape drives, SMS configuration services is updated to validate these recording technology values.

MVS Device Allocation

MVS device allocation helps prioritize and select tape drives to meet the needs of application programs or system functions. Batch (JCL) or dynamic (SVC99) allocation makes these device needs known to MVS device allocation. After selecting appropriate devices, MVS device allocation serializes them for the requester to use. It can also request that appropriate volumes be mounted on the allocated devices. It accomplishes these tasks by interfacing with SMS, DEVSERV, OAM, MSGDISP, and other system components.

MVS device allocation currently supports multiple types of tape devices. Within an IBM tape library environment, MVS device allocation is aware of media types and recording technologies and takes them into consideration when allocating tape drives and tape volumes. The dynamic allocation (SVC 99) volume interchange text unit (DALINCHG) allows you to specify the value for the 256-track recording technology or the 384-track recording technology.

Refer to Table 2 on page 14 for the specific SVC 99 DALINCHG parameter values. See *z/OS MVS Programming: Authorized Assembler Services Guide* for more information about the DALINCHG parameter.

Chapter 5. ISMF Modifications

Interactive storage management facility (ISMF) provides a series of applications for storage administrators to define and manage SMS configurations. This chapter explains the software support changes that were made to the data class define and mountable tape volume applications to support the Model E1x tape drive and the Model H1x tape drive.

Data Class Define and Alter Panels

A data class is a set of data set allocation attributes and associated values. Its manipulation functions are define, alter, display, and list. You can define or alter data class attributes and their values by using the ISMF data class define/alter panel. In support of Model E1x and Model H1x tape drives, the data class define/alter panel has changed. In this panel, the value 384 is added to the recording technology attribute to support the Model H1x tape drive. A value for the recording technology attribute is not required; the default is blank.

See *z/OS DFSMSdfp Storage Administration Reference* for additional information about the ISMF data class application.

Mountable Tape Volume List Panel

The mountable tape volume application allows you to create, save, and restore lists of tape cartridge volumes. It generates lists of mountable tape volumes and their characteristics based on the criteria you specify. As shown in Figure 14, the mountable tape volume list panel now displays **384TRACK** for those volumes that were recorded using 384-track recording technology on high-performance cartridge tape media (MEDIA3) or extended high-performance cartridge tape media (MEDIA4). The new value appears in column 9, RECORDING TECHNOLOGY. This change supports the Model H1x tape drive.

See *z/OS DFSMS OAM Planning, Installation, and Storage Administration Guide for Tape Libraries* for additional information on the ISMF mountable tape volume application.

Panel List Utilities Scroll Help						

MOUNTABLE TAPE VOLUME LIST						
Command ==>			Scroll ==> HALF			
			Entries 1-5 of 5			
Enter Line Operators below:			Data Columns 6-10 of 20			
LINE	VOLUME LIBRARY	STORAGE	MEDIA	RECORDING		
OPERATOR	SERIAL NAME	GRP NAME	TYPE	TECHNOLOGY	COMPACTION	
---(1)---	-(2)-- --(6)---	--(7)---	-(8)--	---(9)---	---(10)---	
	003190 ATLLIB01	SGTAPE1	MEDIA3	384TRACK	YES	
	003191 ATLLIB01	SGTAPE1	MEDIA3	128TRACK	YES	
	003192 ATLLIB01	SGTAPE1	MEDIA4	256TRACK	YES	
	003193 ATLLIB01	SGTAPE1	MEDIA1	18TRACK	---	
	003194 ATLLIB01	SGTAPE1	MEDIA2	36TRACK	---	
-----	-----	-----	BOTTOM	OF DATA	-----	----

Figure 14. Mountable Tape Volume List Panel (DGTLP31)

ISMF message DGTDC041 has been changed to support the Model H1x tape drive. This message appears when you have entered an incorrect RECORDING TECHNOLOGY value. Figure 15 displays the modified message.

```
HELP-----ISMF MESSAGE-----HELP
COMMAND ==>

MESSAGE NUMBER:  DGTDC041

SHORT MESSAGE:   INVALID RECORDING TECH

LONG MESSAGE:    RECORDING TECHNOLOGY must be 18, 36, 128, 256, 384 or blank

EXPLANATION:
  You have entered an invalid RECORDING TECHNOLOGY value.

SUGGESTED ACTION:
  Correct and re-enter RECORDING TECHNOLOGY. RECORDING
  TECHNOLOGY must be 18 (18TRACK), 36 (36TRACK), 128 (128TRACK),
  256 (256TRACK), 384 (384TRACK) or blank.

Use ENTER to continue with ISMF HELP, Use END to return to ISMF.
```

Figure 15. ISMF Message DGTDC041: Invalid Recording Technology

Chapter 6. O/C/EOV Modifications

The z/OS DFSMS open/close/end-of-volume (O/C/EOV) component is a set of system routines that perform tape label processing.

As documented in this chapter, the O/C/EOV routines resolve recording technology conflicts and reflect the 256-track or 384-track recording technologies in the SMS-managed TCDB volume records. With support of the 3590 Model E1x tape drive, the O/C/EOV routines also include a revised IFGTEP macro with several new fields for mapping installation exit parameter lists. Additionally with the 3590 Model H1x tape drive support, a new value can be returned in TEPMRECTK for 384-track.

The updated O/C/EOV routines support real and emulated 3590 devices and associated cartridge types. You can use these devices as stand-alone or IBM tape library devices (automated or manual).

See *z/OS DFSMS: Using Data Sets* and *z/OS DFSMS: Using Magnetic Tapes* for additional information about the O/C/EOV routines.

Resolving Recording Technology Conflicts

Models B1x, E1x, and H1x tape drives can write to MEDIA3 and MEDIA4 media types, the two 3590 cartridge types. Conflicts occur, however, with the following scenarios:

- When a 256TRK-recorded cartridge is mounted on a 128TRK-only tape drive
- When a 384TRK-recorded cartridge is mounted on a 128TRK or a 256TRK tape drive

The OPEN and EOVS routines can resolve these recording technology conflicts if you meet the following conditions:

- Set OPEN for output to the first file
- Specify **VOLNSNS=YES** in the DEVSUPxx member of PARMLIB
- Position the tape cartridge at the loadpoint

If these conditions are met and if the cartridge has an internal *volser* recorded in its volume control region, OPEN and EOVS routines rewrite the VOL1 label with the volume identifier in the sense data.

Note: To enable this support, make sure that the 3590 Model B and Model E devices are at the appropriate microcode level, so that an up-level volume can have its volume identifier returned in the sense data.

See *z/OS DFSMS: Using Magnetic Tapes* and *z/OS DFSMS Installation Exits* for additional information on resolving recording technology conflicts.

SMS-Managed TCDB Volume Record

The OPEN and EOVS routines update the SMS-managed TCDB volume records with an indicator for the 256-track and 384-track recording technologies.

See *z/OS DFSMS OAM Planning, Installation, and Storage Administration Guide for Tape Libraries* for more information on tape volume records.

IFGTEP Macro

The IFGTEP macro maps the main and function-specific parameter lists for all O/C/EOV tape management exits. The IFGTEP macro has several fields that map the installation exit parameter lists. These fields are initialized for both SMS and non-SMS tapes.

See *z/OS DFSMS Installation Exits* for more information on O/C/EOV installation exit parameter lists.

Table 3 describes the IFGTEP fields for mapping the installation exit main parameter list.

Table 3. IFGTEP Fields for the Installation Exit Main Parameter List

Offset	Length or Bit Pattern	Field Name	Description
31 (X'1F')	8	TEPMRECTK	Recording technology: 0=unknown 1=18TRK 2=36TRK 3=128TRK 4=256TRK 5=384TRK
34 (X'22')	8	TEPMMEDT	Media type: 1=Media1 2=Media2 3=Media3 4=Media4
96 (X'60')	31	TEPMCAPM	Media capacity (MB) of the mounted volume for Model E1x or Model H1x tape drives (emulating 3590-1 and 3490E)
100 (X'64')	31	TEPMCAPP	Reserved for future use

Chapter 7. DFSMSHsm Modifications

DFSMS hierarchical storage manager (DFSMSHsm™), a z/OS functional component, automatically manages low activity and inactive data in both system-managed and non-system-managed environments. It also provides automatic backup and recovery of active data in the same environments.

This chapter describes specific changes to DFSMSHsm support for the 3590 Model B1x, Model E1x, and Model H1x tape drives. These changes are as follows:

- Output tape selection
- Output tape utilization

Output Tape Selection

DFSMSHsm can now select 3590 Model B1x, Model E1x, and Model H1x tape drives for output in SMS and non-SMS tape environments. All its allocation requests are performed using the following standard dynamic allocation interfaces:

- **Non-SMS-managed output tape selection:** If multiple 3590 models are installed, you must define an esoteric name for each model that DFSMSHsm uses. You must then define the esoteric names to DFSMSHsm using the SETSYS USERUNITTABLE(*esoteric1:esoteric1,esoteric2:esoteric2,...*) command. You must also specify the esoteric names as the unit names for the desired DFSMSHsm functions. If a single 3590 model is installed, you do not have to define an esoteric name; instead, you can specify the 3590-1 generic name for the desired DFSMSHsm functions.
- **SMS-managed output tape selection:** DFSMSHsm performs a non-specific allocation; it then finds an acceptable output tape for the already allocated drive.

See *z/OS DFSMSHsm Storage Administration Reference* for additional information on the SETSYS USERUNITTABLE command and the *unitname* values for various DFSMSHsm functions.

Output Tape Utilization

DFSMSHsm writes to 97% of the capacity of 3590 high-performance and extended high-performance cartridge tapes on Model B1x, E1x, and H1x drives, unless otherwise specified by the installation. Other percentages can be specified using the SETSYS TAPEUTILIZATION command, depending on the particular needs of the installation. DFSMSHsm uses the reported cartridge type on the physical device to determine the tape's capacity.

See *z/OS DFSMSHsm Storage Administration Reference* for additional information on the SETSYS TAPEUTILIZATION command.

Chapter 8. DFSMSrmm Modifications

DFSMSrmm™ is a feature of z/OS. It manages all tape media, such as cartridge system tapes and 3420 reels, and other removable media you define to it.

DFSMSrmm performs the following functions to support the 3950 Model E1x and Model H1x tape drives:

- Records the 256-track or 384-track recording technology, as appropriate.
- Records the physical capacity of cartridge media.
- Tracks the total block count of multivolume data sets for all device types.
- When a volume is labeled or erased, DFSMSrmm determines the recording technology and media type of the volume. If the system and the tape drive support this function, RMM updates the control data set volume information using the DFSMSrmm EDGINERS utility with the determined media type and, optionally, the recording format. Table 4 shows the updates that the EDGINERS utility makes to the DFSMSrmm control data set based on the type of hardware you have installed.

Table 4. Updates Made by the EDGINERS Utility to the DFSMSrmm Control Data Set

When you have installed...	DFSMSrmm updates...
3590 hardware (Models B1x, E1x, and H1x)	Volume MEDIATYPE and volume RECORDINGFORMAT
3490 hardware	Volume MEDIATYPE
Other tape drives	No changes are made

- See *z/OS DFSMSrmm Implementation and Customization Guide* for more information on the EDGINERS utility.

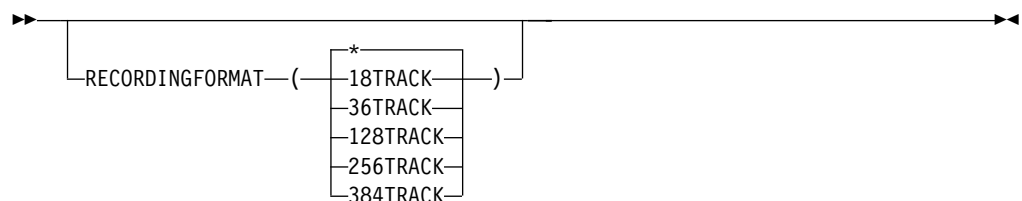
This chapter describes the updates to the following DFSMSrmm TSO subcommands:

- ADDVOLUME
- CHANGEVOLUME
- LISTDATASET
- LISTVOLUME
- SEARCHVOLUME

It also lists the new REXX variables of the TSO subcommand, API structured field introducers, and mapping macros fields.

ADDVOLUME

The ADDVOLUME TSO subcommand adds volumes to the DFSMSrmm control data set. The following diagram shows the syntax of the RECORDINGFORMAT operand for the ADDVOLUME TSO subcommand.



To use the 256TRACK or 384TRACK recording format, you must specify the **MEDIATYPE**(HPCT) or **MEDIATYPE**(EHPCT) operand of the ADDVOLUME TSO subcommand.

Note: DFSMSrmm uses its own media names. Table 5 lists these names.

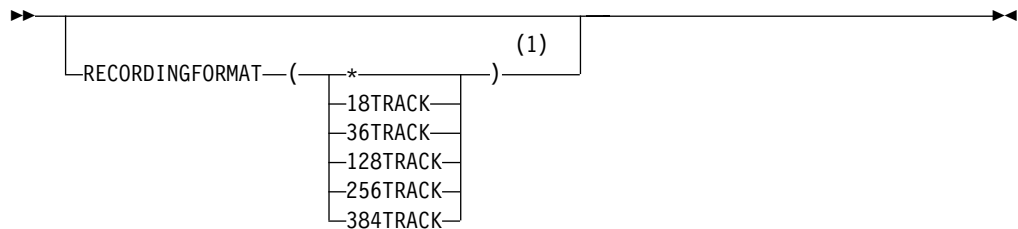
Table 5. DFSMSrmm Media Names

Media Name	DFSMSrmm Media Name
MEDIA1	CST
MEDIA2	ECCST
MEDIA3	HPCT
MEDIA4	EHPCT

See *z/OS DFSMSrmm Guide and Reference* for the complete syntax of the DFSMSrmm ADDVOLUME subcommand.

CHANGEVOLUME

The CHANGEVOLUME TSO subcommand updates details for a volume defined to DFSMSrmm. The following diagram shows the syntax of the RECORDINGFORMAT operand for the CHANGEVOLUME TSO subcommand.



Notes:

- 1 Cannot be specified if DFSMSrmm automatically records the information, unless the FORCE operand is also specified.

To use the 256TRACK or 384TRACK recording format, you must specify the **MEDIATYPE**(HPCT) or **MEDIATYPE**(EHPCT) operand of the CHANGEVOLUME TSO subcommand.

See *z/OS DFSMSrmm Guide and Reference* for the complete syntax of the DFSMSrmm CHANGEVOLUME subcommand.

LISTDATASET

The LISTDATASET subcommand displays data set information recorded in the DFSMSrmm control data set.

As shown in Figure 16 on page 41, the LISTDATASET output displays the total block count. The vertical line to the left of the panel indicates this value.


```

RMM LISTDATASET '#281753.DUMPOF.ICFCAT.BCRMVEG'

Data set name = #281753.DUMPOF.ICFCAT.BCRMVEG
Job name      = PERS01
Volume       = BC0047          Physical file sequence number = 1
Device number = 05FB           Owner = #281753 Data set sequence = 1
Create date  = 04/01/1996 Create time = 10:12:45 System ID = BCRVSC1
Block size   = 32760           Block count = 900 Total block count = 900
Logical Record Length = 0      Record Format = U
Date last written = 04/01/1996 Date last read = 04/01/1996
Step name    = RDS             DD name = TAPE
Management class = VRS management value =
Storage group = VRS retention date =
Storage class = VRS retained = NO
Data class   = ABEND while open = NO
Catalog status = UNKNOWN

Primary VRS details:
  Name =
  Job name = Type =
  Subchain NAME = Subchain start date =
Secondary VRS details:
  Value or class =
  Job name =
  Subchain NAME = Subchain start date =
Security Class = IU0 Description = IBM INTERNAL USE ONLY

```

Figure 16. LISTDATASET Output

See *z/OS DFSMSrmm Guide and Reference* for more information on the LISTDATASET subcommand.

LISTVOLUME

The LISTVOLUME subcommand displays volume information recorded in the DFSMSrmm control data set.

As shown in Figure 17 on page 42, the LISTVOLUME output displays the value 256TRACK for the recording technology format of a Model E1x tape drive. If the volume were recorded on a Model H1x tape drive, 384TRACK would be displayed. The vertical line to the left of the panel indicates this value.

```

DFSMSrmm LISTVOLUME DSP000 VOLUME RECORDINGFORMAT(256TRACK)

Volume Information:
Volume = DSP000      Rack   = DSP000   Owner = ZWT59   Jobname =
Create Date   = 17/02/1994 Create Time = 11:23:35
Assigned Date = 17/02/1994 Assigned Time = 11:23:34
Expiration Date = 22/02/1994 Original   =
Retention Date = 22/03/1994
Data set name = ZWT59.TEST
Volume Status:
Status = MASTER      Availability = Vital Record      Label = SL
Media Information:
Density = *          Type = HPCT          Format = 256TRACK Compaction = YES
Special attributes = NONE
Action on Release:
Scratch = Y Replace = N Return = N Init = N Erase = N Notify = N
Actions pending:
Scratch = N Replace = N Return = N Init = N Erase = N Notify = N
Storage group =
Loan location =          Account =
Description =
Security class = U          Description = UNCLASSIFIED

```

```

Access information:
Owner access = ALTER  Volume access = NONE    Last change = D027182
VM use = N   MVS use = Y
Access list:

Statistics:
Number of data sets = 0      Data set recording= ON
Volume Usage(Kb)= 0         Use Count       = 0
Volume capacity = 30000
Date last read =            Date last written =
Drive last used =
Volume sequence = 1          Media name      = 3480
Previous volume =            Next volume     =
Product Number =            Level           = V R M
Feature code =

Error counts:
Temporary read = 0          Temporary write = 0
Permanent read = 0          Permanent write = 0

Store Information:
Location      = SHELF      Destination =          Intransit   = N
Location type =            Home location = SHELF    Old location =
Required location =
Movement tracking date =
Bin number    =            Media name =
Old bin number =          Media name =
In Container  =

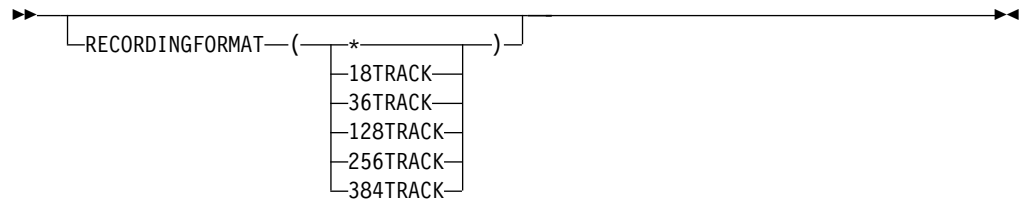
```

Figure 17. LISTVOLUME Output

See *z/OS DFSMSrmm Guide and Reference* for more information on the LISTVOLUME subcommand.

SEARCHVOLUME

You can use the SEARCHVOLUME TSO subcommand to obtain a list of volumes that match selection criteria that you specify. Specifying 256TRACK or 384TRACK allows you to limit your search to volumes that are written in the 256-track format or 384-track format, respectively. The following diagram shows the syntax of the RECORDINGFORMAT operand for the SEARCHVOLUME TSO subcommand.



See *z/OS DFSMSrmm Guide and Reference* for the complete syntax of the DFSMSrmm SEARCHVOLUME subcommand.

REXX Variables

You can use the REXX variables to obtain volume information. The variables produced by the SEARCHVOLUME subcommand are stem variables.

Table 6. New TSO Subcommand REXX Variables

Variable Name	Subcommands	Contents	Format
EDG@MEDR	LV, SV	Tape recording technology	8 characters: <ul style="list-style-type: none"> • 18TRACK • 36TRACK • 128TRACK • 256TRACK • 384TRACK, or • *
EDG@VCAP	LV	Volume capacity	10 characters
EDG@BLKT	LD	Total block count	10 characters

See *z/OS DFSMSrmm Guide and Reference* for information on other REXX variables.

API Structured Field Introducers

The DFSMSrmm application programming interface (API) returns data as structured fields in an output buffer that you define. Structured fields consist of a structured field introducer (SFI) and the data. SFIs describe the type, length, and other characteristics of the data.

Table 7 shows the structured field introducers that support Model E1x and Model H1x tape drives.

Table 7. New Structured Field Introducers

Name	Number	Type	Length	Value	Subcommands
MEDR	857000	3 (binary)	9	Recording technology <ul style="list-style-type: none"> 0 = Non cartridge 1 = 18TRACK 2 = 36TRACK 3 = 128TRACK 4 = 256TRACK 5 = 384TRACK 	LV VOL, SV
VCAP	8B0B00	5 (binary)	12	Volume capacity	LV STATS, SV(e)

Table 7. New Structured Field Introducers (continued)

Name	Number	Type	Length	Value	Subcommands
BLKT	80D030	5 (binary)	12	Total block count	LD, SD(e)

See *z/OS DFSMSrmm Application Programming Interface* for further information about the DFSMSrmm API.

Mapping Macros

Table 8 shows the changes made to DFSMSrmm mapping macros with the introduction of the Model E1x tape drive. The changes also apply to the Model H1x tape drive.

Table 8. New Mapping Macro Fields

Mapping Macro	Function	Updates
EDGRDEXT	Maps the data set records in the DFSMSrmm extract data set	A new field for total block count
EDGRVEXT	Maps the volume records in the DFSMSrmm extract data set	<ul style="list-style-type: none"> A new field for volume capacity The commentary associated with TDSI fields
EDGSDREC	Maps the DFSMSrmm SMF data set records	A new field for total block count
EDGSVREC	Maps the DFSMSrmm SMF volume records	<ul style="list-style-type: none"> A new field for volume capacity The commentary associated with TDSI fields

See *z/OS DFSMSrmm Implementation and Customization Guide* for additional information about DFSMSrmm mapping macros.

Chapter 9. EREP Modifications

Environmental Recording, Editing, and Printing (EREP) program is a diagnostic application program that runs under MVS, VM, and VSE. It generates and prints reports from ERDS records. With these reports, IBM service representatives can determine the existence, nature, and location of a problem.

This chapter documents the updates to the event history, system error summary, and emulated device summary reports of the EREP program to support Model E1x and Model H1x tape drives.

Event History Report

As shown in Figure 18, EREP reports 3590 as the native device type in its event history report in support of Model E1x and Model H1x tape drives.

EVENT HISTORY (S/370 & S/370XA)						
TIME	JOBNAME	RECTYP	CP	CUA	SSYS	DEVT
			*	DNO		CRW
DATE 358 99						
02 15 34 50	N/A	MDR	01	04B2	3590	04
02 22 35 74	N/A	MDR	00	04B0	3590	04
10 02 06 17	DRVNDSA	OBRTMP	03	0591	3590	
10 02 10 78	DRVNDSA	OBRPRM	03	0591	3590	
12 54 45 51	VARY	OBRPRM	06	0563	3590	06
23 08 25 93	DISB/RGP	OBRTMP	00	04BA	3590	04
23 08 25 93	DISB/RGP	OBRPRM	00	04BA	3590	
23 08 25 93	DISB/RGP	OBRTMP	00	04BE	3590	16

Figure 18. Partial Event History Report

System Error Summary Report

Figure 19 on page 46 illustrates that the EREP system error summary report is also changed to support Model E1x and Model H1x tape drives. The system error summary for 3590 includes the system error summary report series for 3490. These reports are only shown for 3590 devices that emulate 3490 devices.

SYSTEM ERROR SUMMARY (PART 2)									
REPORT DATE 054 99									
PERIOD FROM 044 98									
TO 022 02									
TIME	JOBNAME	CPU	PHYSICAL ID	PHYSICAL TYPE	PHYSICAL ADDRESS	ERROR PATH	ERROR VOLUME	ERROR DESC	PROBABLE FAILING
DATE 358/99									
10:02:10:78	DRVNDSA	02	N/A	3590	0591	0591		N/A	HARDWARE
23:08:25:93	DISB/RGP	00	N/A	3590	04BA	16-04BA		N/A	VOLUME/C

Figure 19. Partial System Error Summary Report

Emulated Device Summary Report

Figure 20 provides an example of an EREP emulated device summary report. The report in this example shows the emulated device type for Model E1x and Model H1x tape drives.

3590 DEVICE SUMMARY			REPORT DATE 104 99
			PERIOD FROM 044 98
			TO 019 99
DEVICE ADDRESS	REAL	/ EMULATED DEVICE TYPE	
014C	3590-E1X	/ 3490-CXX	
014D	3590-B1X	/ 3490-CXX	
014E	3590-E1X	/ 3490-CXX	
0231	3590-H1X	/ 3490-CXX	
0232	3590-H1X	/ 3490-CXX	
0233	3590-H1X	/ 3490-CXX	
04B8	3590-B1X	/ 3490-CXX	
04B9	3590-B1X	/ 3490-CXX	
04BA	3590-B1X	/ 3490-CXX	
04BB	3590-B1X	/ 3490-CXX	
04BC	3590-B1X	/ 3490-CXX	
0591	3590-E1X	/ 3490-CXX	
0592	3590-E1X	/ 3490-CXX	
0880	3590-XXX	/ NATIVE	
0881	3590-XXX	/ NATIVE	
0882	3590-XXX	/ NATIVE	
0883	3590-XXX	/ NATIVE	
0884	3590-XXX	/ NATIVE	
088A	3590-XXX	/ NATIVE	
08AA	3590-E1X	/ 3590-B1X	
08AB	3590-E1X	/ 3590-B1X	
08AC	3590-E1X	/ 3590-B1X	

Figure 20. Partial Emulated Device Summary Report

Chapter 10. JES3 Modifications

Job Entry Subsystem 3 (JES3), a z/OS MVS subsystem, manages resources and workflow before and after jobs are processed. As documented in this chapter, JES3 is also modified to support Model E1x and Model H1x tape drives in an SMS-managed IBM tape library environment (automated or manual).

JES3 In an IBM Tape Library

You can now enable JES3 to allocate Model E1x and Model H1x tape drives and tape volumes in an SMS-managed IBM tape library. To do so, you need to specify one or both of the following library device group (LDG) names in your JES3plex. An LDG is a predefined set of tape subsystems within a JES3plex.

- **LDC**sssss. The serial number sssss indicates the library within which a Model E1x tape drive emulates a 3590-1.
- **LDG**dddd. dddd=359E indicates that a Model E1x tape drive emulates a 3590-1 in any library within the JES3plex.
- **LDG**dddd. dddd=359H indicates that a Model H1x tape drive emulates a 3590-1 in any library within the JES3plex.
- **LDF**sssss. The serial number sssss indicates the library within which a Model H1x tape drive emulates a 3590-1.

See *z/OS JES3 Initialization and Tuning Reference* for additional information on LDGs, JES3, and JES3plex.

Tape Verification Processing (IATLVVR Module)

The JES3 tape verification processing, namely, the IATLVVR module, is updated to extract VOLSER information from the volume's sense data if a 256TRACK scratch tape is mounted on a 128TRACK (Model B1x) drive, or if a 384TRACK tape is mounted on a 256TRACK (Model E1x) drive or a 128TRACK (Model B1x) drive.

Appendix. Accessibility

Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, to use software products successfully. The major accessibility features in z/OS enable users to:

- Use assistive technologies such as screen-readers and screen magnifier software
- Operate specific or equivalent features using only the keyboard
- Customize display attributes such as color, contrast, and font size

Using assistive technologies

Assistive technology products, such as screen-readers, function with the user interfaces found in z/OS. Consult the assistive technology documentation for specific information when using it to access z/OS interfaces.

Keyboard navigation of the user interface

Users can access z/OS user interfaces using TSO/E or ISPF. Refer to *z/OS TSO/E Primer*, *z/OS TSO/E User's Guide*, and *z/OS ISPF User's Guide Volume I* for information about accessing TSO/E and ISPF interfaces. These guides describe how to use TSO/E and ISPF, including the use of keyboard shortcuts or function keys (PF keys). Each guide includes the default settings for the PF keys and explains how to modify their functions.

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Glossary

The terms in this glossary are defined as they pertain to the software support for the IBM TotalStorage Enterprise Tape System 3590 Models E1x and H1x.

This glossary may include terms and definitions from the following references:

- The *American National Standard Dictionary for Information Systems*, ANSI X3.172-1990, copyright 1990 by the American National Standards Institute (ANSI). Copies may be purchased from the American National Standards Institute, 11 West 42nd Street, New York 10036.
- The *Information Technology Vocabulary*, developed by Subcommittee 1, Joint Technical Committee 1, of the International Electrotechnical Commission (ISO/IEC JTC2/SC1).
- IBM Dictionary of Computing, New York: McGraw-Hill, 1994.

A

access method services (AMS). A multifunction service program that manages VSAM and non-VSAM data sets, as well as integrated catalog facility (ICF) catalogs.

ACF. Automated cartridge facility.

ACL. Automatic cartridge loader.

ACS. Automatic class selection.

allocation. Generically, the entire process of obtaining a volume and unit of external storage, and setting aside space on that storage for a data set.

AMS. Access method services.

AOM. Asynchronous operation manager.

APAR. Authorized program analysis report.

API. Application programming interface.

ATL. Automated tape library.

ATLDS. Automated tape library dataserver.

automated tape library. A device consisting of robotic components, cartridge storage areas, tape subsystems, and controlling hardware and software, together with the set of tape volumes that reside in the library and can be mounted on the library tape drives.

automatic cartridge loader. An optional feature of the 3480 magnetic tape subsystem that allows preloading of multiple tape cartridges. This feature is standard in the 3490 magnetic tape subsystem.

automatic class selection (ACS). Routines that determine the data class, management class, storage class, and storage group for a JCL DD statement. The storage administrator is responsible for establishing ACS routines appropriate to an installation's storage requirements.

B

backup. The process of creating a copy of a data set or object to be used in case of accidental loss.

C

cartridge system tape. The base tape cartridge media used with 3480 or 3490 magnetic tape subsystems.

construct. One of the following: data class, storage class, management class, storage group, aggregate group, base configuration.

cross-coupling facility (XCF). A component of the MVS operating system that provides functions to support cooperation between authorized programs running within a sysplex.

D

DASD. Direct access storage device.

DASD volume. A DASD space identified by a common label and accessed by a set of related addresses.

data class. A collection of allocation and space attributes, defined by the storage administrator, that is used to create a data set.

Data Facility Sort (DFSORT). An IBM-licensed program that is a high-speed data processing utility. DFSORT provides an efficient and flexible way to handle sorting, merging, and copying operations, as well as providing versatile data manipulation at the record, field, and bit level.

data set. The major unit of data storage and retrieval in z/OS DFSMS, consisting of a collection of data in a prescribed arrangement and described by control information to which the system has access.

DDR. Dynamic device reconfiguration.

device. This term is used interchangeably with unit. You mount a tape on a unit or device, such as a 3490.

device category. A storage device classification used by SMS. The device categories are as follows
SMS-managed DASD, SMS-managed tape,
non-SMS-managed DASD non-SMS-managed tape.

DFSMSdftp. DFSMS data facility product. A z/OS DFSMS functional component that provides functions for storage management, data management, program management, device management, and distributed data access.

DFSMSdss. DFSMS data set services. A z/OS DFSMS functional component that provides functions for copying, moving, dumping, and restoring data sets and volumes.

DFSMShsm. DFSMS hierarchical storage manager. A z/OS DFSMS functional component that provides functions for backing up and recovering data, and managing space on volumes in the storage hierarchy.

DFSMShsm-managed volume. (1) A primary storage volume, which is defined to DFSMShsm but which does not belong to a storage group. (2) A volume in a storage group, which is using DFSMShsm automatic dump, migration, or backup services. Contrast with *system-managed volume* and *DFSMSrmm-managed volume*.

DFSMSrmm. DFSMS removable media manager. A z/OS DFSMS functional component that provides functions for managing removable media.

DFSMSrmm control data set. A VSAM key-sequenced data set that contains the complete inventory of your removable media library, as well as the movement and retention policies you define. In the control data set, DFSMSrmm records all changes made to the inventory, such as adding or deleting volumes.

DFSMSrmm-managed volume. A tape volume that is defined to DFSMSrmm. Contrast with *system-managed volume* and *DFSMShsm-managed volume*.

DFSORT. Data Facility Sort.

E

enhanced capacity cartridge system tape. Cartridge system tape with increased capacity that can only be used with 3490E Magnetic Tape Subsystems. Contrast with *cartridge system tape*.

EREP. Environmental Recording, Editing, and Printing.

ESCON. Enterprise systems connection.

F

file. A collection of information treated as a unit. In non-OS/390 UNIX environments, the terms *data set* and *file* are generally equivalent and are sometimes used interchangeably. See also *data set*.

G

GB. GB = 1,000,000,000 bytes for tape storage capacity.

H

hardware configuration definition. An interactive interface in the MVS system that enables an installation to define hardware configurations from a single point of control.

HCD. Hardware configuration definition.

I

Interactive Storage Management Facility (ISMF). The interactive interface of z/OS DFSMS that allows users and storage administrators access to the storage management functions.

IOS. Input/output supervisor.

IPL. Initial program load.

ISMF. Interactive storage management facility.

J

JCL. Job control language.

JES. Job Entry Subsystem .

K

keyword. A predefined word that is used as an identifier.

L

LDG. Library device group.

M

manual tape library (MTL). An installation-defined set of stand-alone tape drives and the set of tape volumes that can be mounted on those drives.

MB. MB = 1,000,000 bytes for tape storage capacity.

MTL. Manual tape library.

MVS. Multiple virtual storage.

MVSCP. Multiple virtual storage configuration program.

MVS/ESA. An environment in the MVS operating system that supports ESA/390.

O

OAM. Object access method.

OAM complex (OAMplex). One or more instances of OAM running on systems that are part of a Parallel Sysplex™. The OAM systems that are part of an OAMplex share a common OAM database in a DB2 data-sharing group.

OAM-managed volumes. Optical or tape volumes controlled by the object access method (OAM).

object access method (OAM). An access method that provides storage, retrieval, and storage hierarchy management for objects and provides storage and retrieval management for tape volumes contained in system-managed libraries.

O/C/EOV. Open/close/end-of-volume.

OS/390. Operating System/390.

P

performance. (1) A measurement of the amount of work a product can produce with a given amount of resources. (2) In a DFSMS environment, a measurement of effective data processing speed with respect to objectives set by the storage administrator. Performance is largely determined by throughput, response time, and system availability.

private tape volume. A volume assigned to specific individuals or functions.

product support plan (PSP) bucket. Contains the instructions and the PTFs for effectively migrating to a new software release.

PSP bucket. Product support plan bucket.

PTF. Program temporary fix.

R

recording format. For a tape volume, the format of the data on the tape; for example, 18, 36, 128, 256, or 384 tracks.

recovery. The process of rebuilding data after it has been damaged or destroyed, often by using a backup copy of the data or by reapplying transactions recorded in a log.

REXX. Restructured extended executor.

S

SCDS. Source control data set.

scratch. The status of a tape volume that is available for general use, because the data on it is incorrect or is no longer needed. You request a scratch volume when you omit the volume serial number on a request for a tape volume mount.

scratch volume. A tape volume that contains expired data only. See *scratch*.

SCSI. Small computer system interface.

SFI. Structured field introducer.

storage administrator. A person in the data processing center who is responsible for defining, implementing, and maintaining storage management policies.

storage class. A collection of storage attributes that identify performance goals and availability requirements, defined by the storage administrator, used to select a device that can meet those goals and requirements.

storage group. A collection of storage volumes and attributes, defined by the storage administrator. The collections can be a group of DASD volumes or tape volumes, or a group of DASD, optical, or tape volumes treated as a single object storage hierarchy. See also *tape storage group*.

storage management. The activities of data set allocation, placement, monitoring, migration, backup, recall, recovery, and deletion. These can be done either manually or by using automated processes. The Storage Management Subsystem automates these processes for you, while optimizing storage resources. See also *Storage Management Subsystem*.

Storage Management Subsystem (SMS). A z/OS DFSMS facility used to automate and centralize the management of storage. Using SMS, a storage administrator describes data allocation characteristics, performance and availability goals, backup and retention requirements, and storage requirements to the system through data class, storage class, management class, storage group, and ACS routine definitions.

storage subsystem. A storage control and its attached storage devices. See also *tape subsystem*.

subsystem. A special MVS task that provides services and functions to other MVS users. Requests for service are made to the subsystem through a standard MVS facility known as the subsystem interface (SSI). Standard MVS subsystems are the master subsystem and the job entry subsystems JES2 and JES3.

system-managed storage. Storage managed by the Storage Management Subsystem. SMS attempts to deliver required services for availability, performance, and space to applications.

SVC. Supervisor call

system-managed tape library. A collection of tape volumes and tape devices, defined in the tape configuration database. A system-managed tape library can be automated or manual. See also *tape library*.

T

tape configuration database (TCDB). One or more volume catalogs used to maintain records of system-managed tape libraries and tape volumes.

tape library. A set of equipment and facilities that support an installation's tape environment. This can include tape storage racks, a set of tape drives, and a set of related tape volumes mounted on those drives. See also *system-managed tape library*.

tape storage group. A type of storage group that contains system-managed private tape volumes. The tape storage group definition specifies the system-managed tape libraries that can contain tape volumes. See also *storage group*.

tape subsystem. A magnetic tape subsystem consisting of a controller and devices, which allows for the storage of user data on tape cartridges.

tape volume. A tape volume is the recording space on a single tape cartridge or reel. See also *volume*.

TCDB. Tape configuration database.

TSO. Time-sharing option.

V

VOLSER . Volume serial number.

volume. The storage space on DASD, tape, or optical devices, which is identified by a volume label.

volume serial number (VOLSER). An identification number in a volume label that is assigned when a volume is prepared for use on the system. For standard label volumes, the volume serial number is the VOL1 label of the volume. For volumes without labels, the volume serial number is the name the user assigns to the volume.

X

XCF. Cross-coupling facility.

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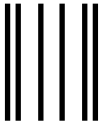


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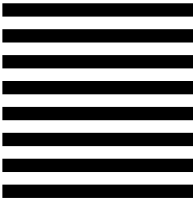
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